

Figure 6-48. Radio Set Control C-1015/ARC-27A,
Practical Wiring Diagram

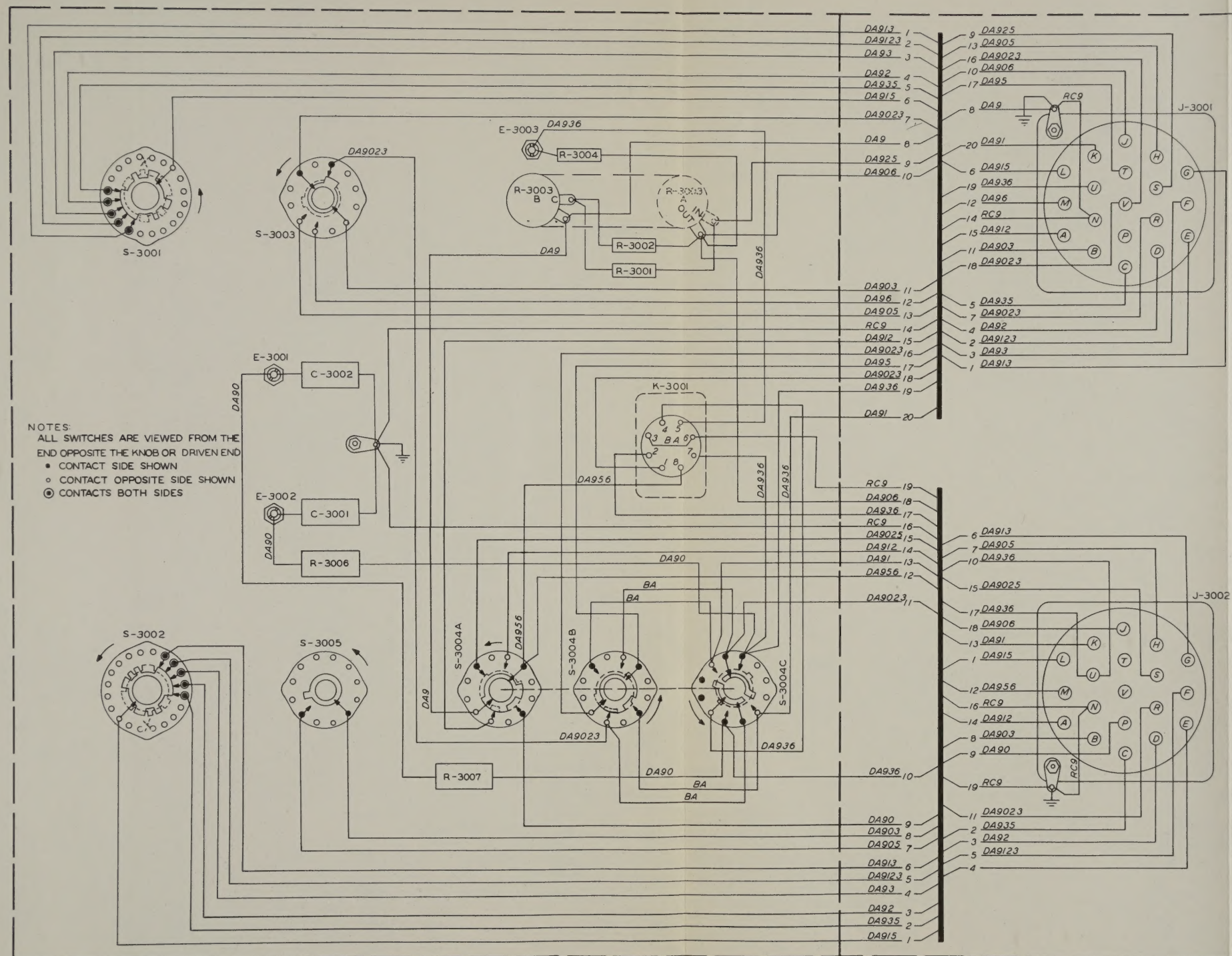


Figure 6-47. Radio Set Control C-914/ARC-27, Practical Wiring Diagram

RESTRICTED



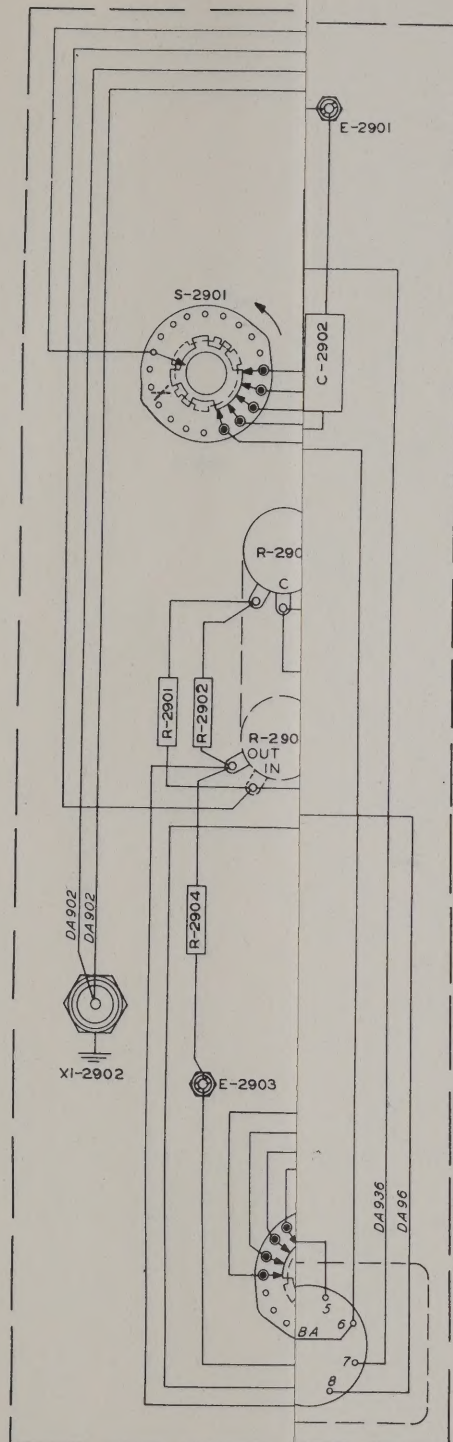


Figure 6-46. Radio Set Control C-91

Revised 15 March 1953



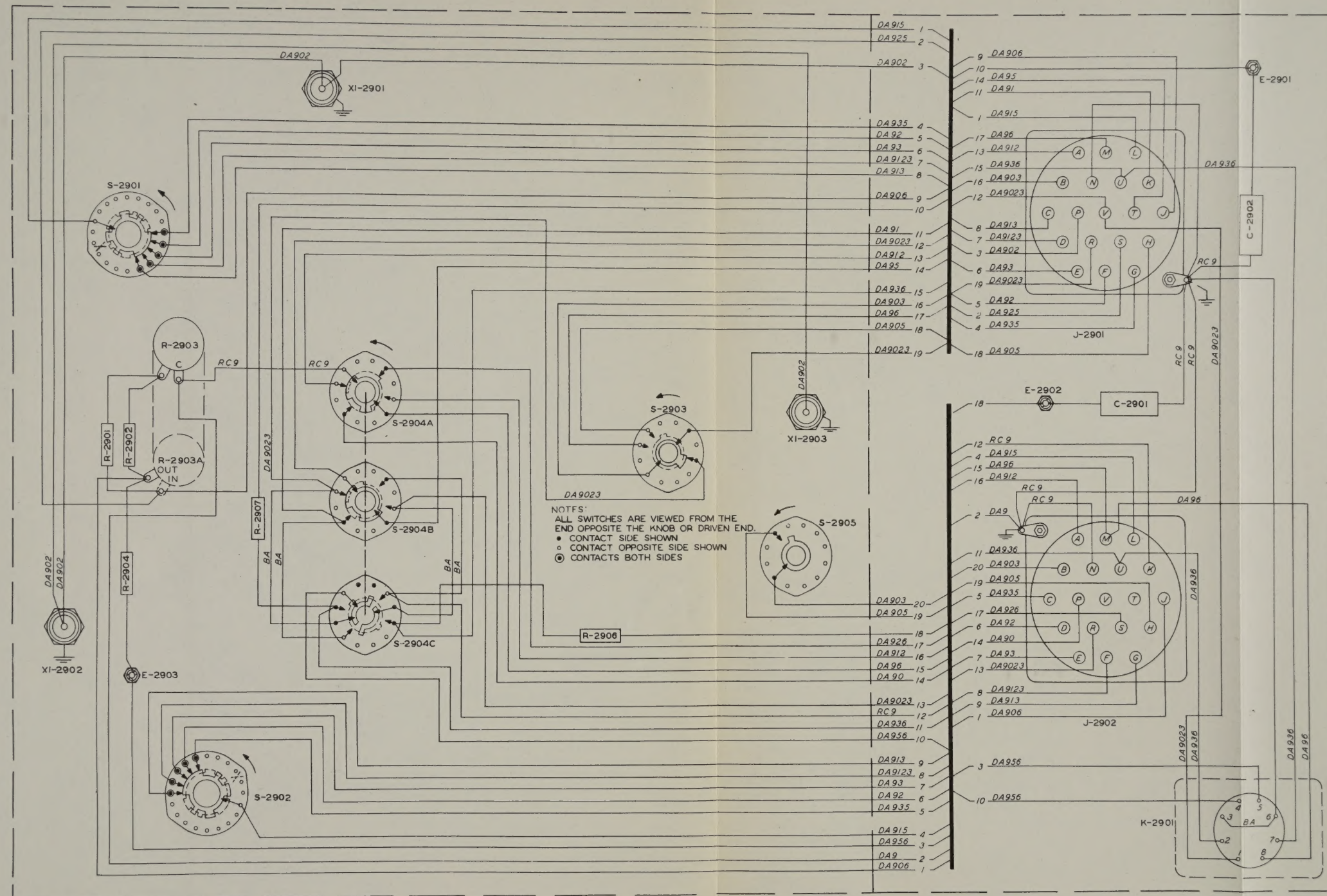
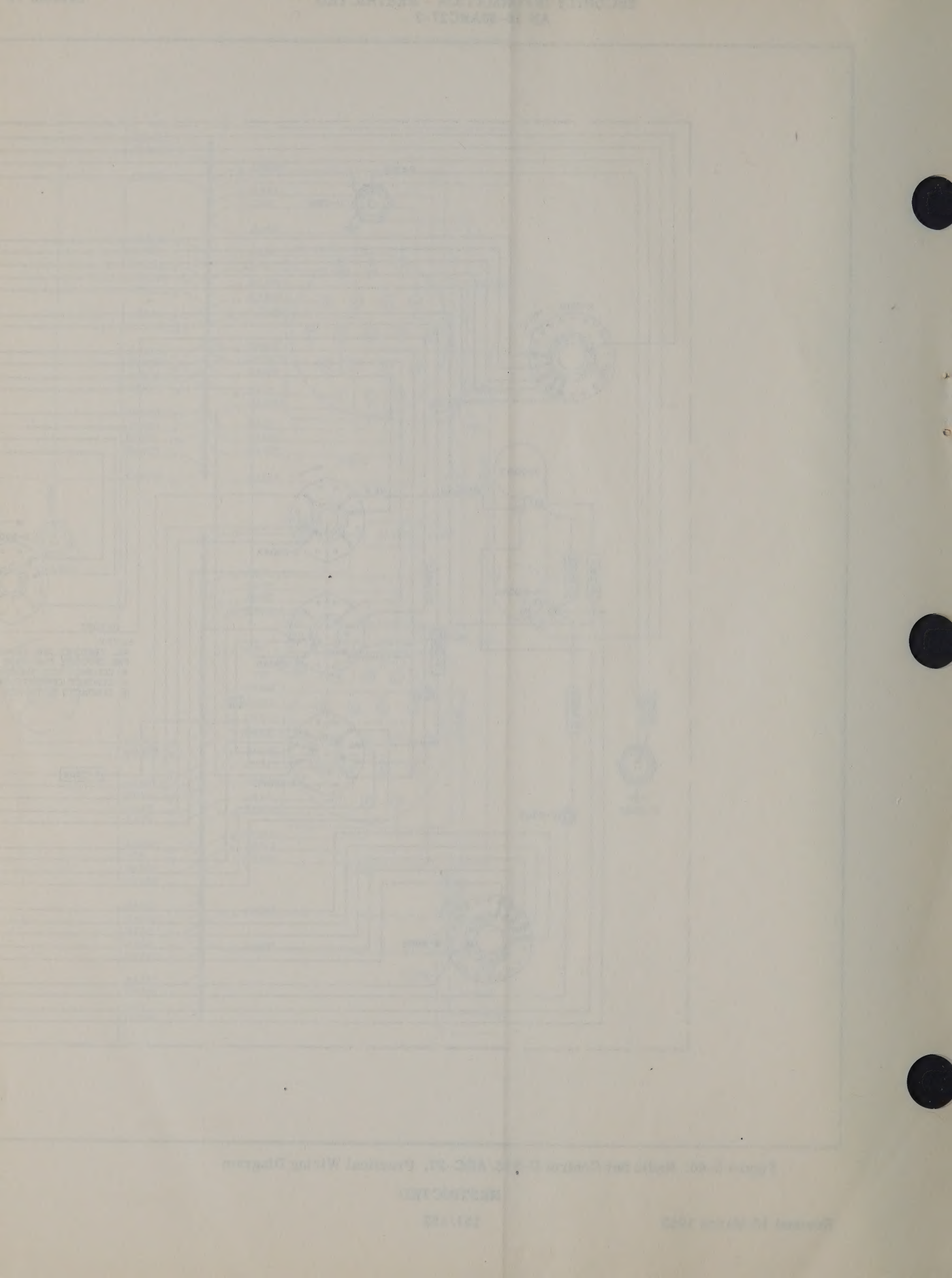


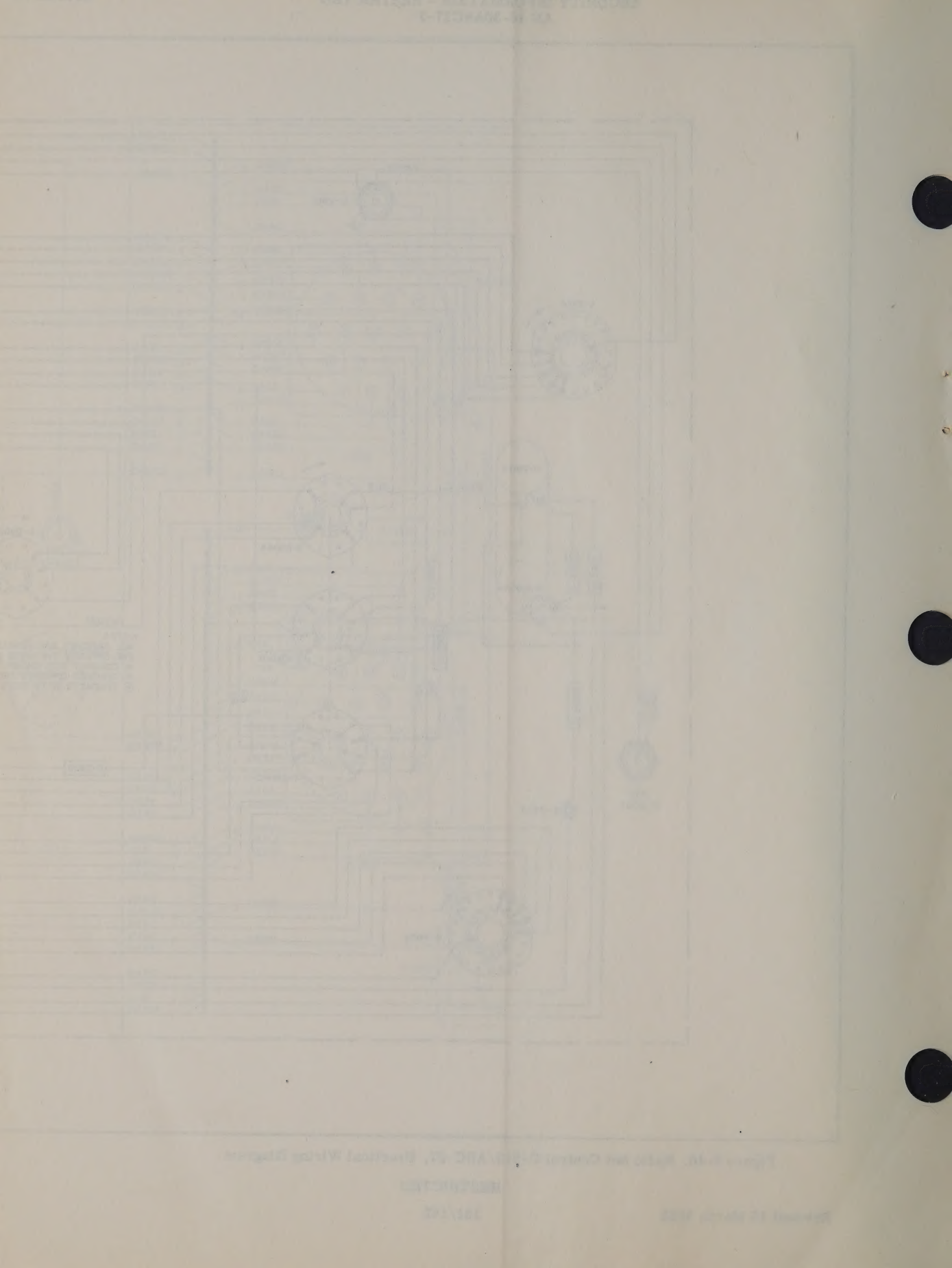
Figure 6-46. Radio Set Control C-913/ARC-27, Practical Wiring Diagram

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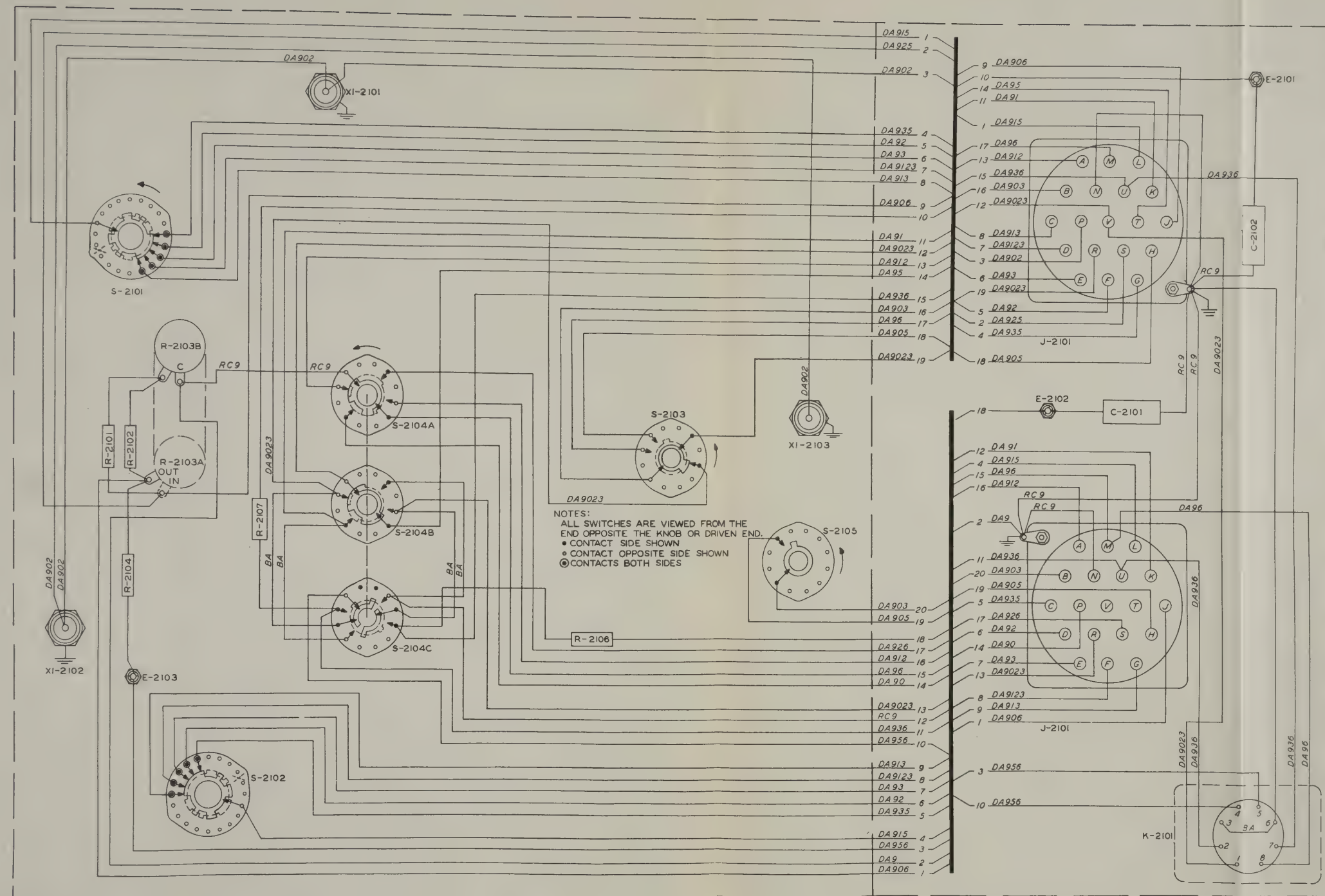


Figure 6-45. Radio Set Control C-853/ARC-27, Practical Wiring Diagram

RESTRICTED

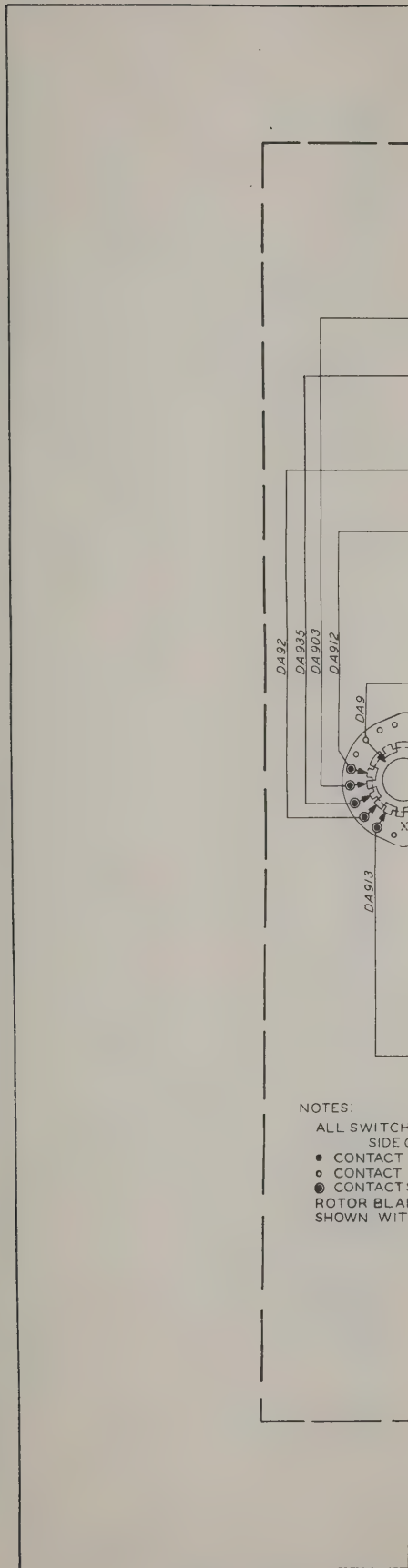


Figure 6-44. Radio S

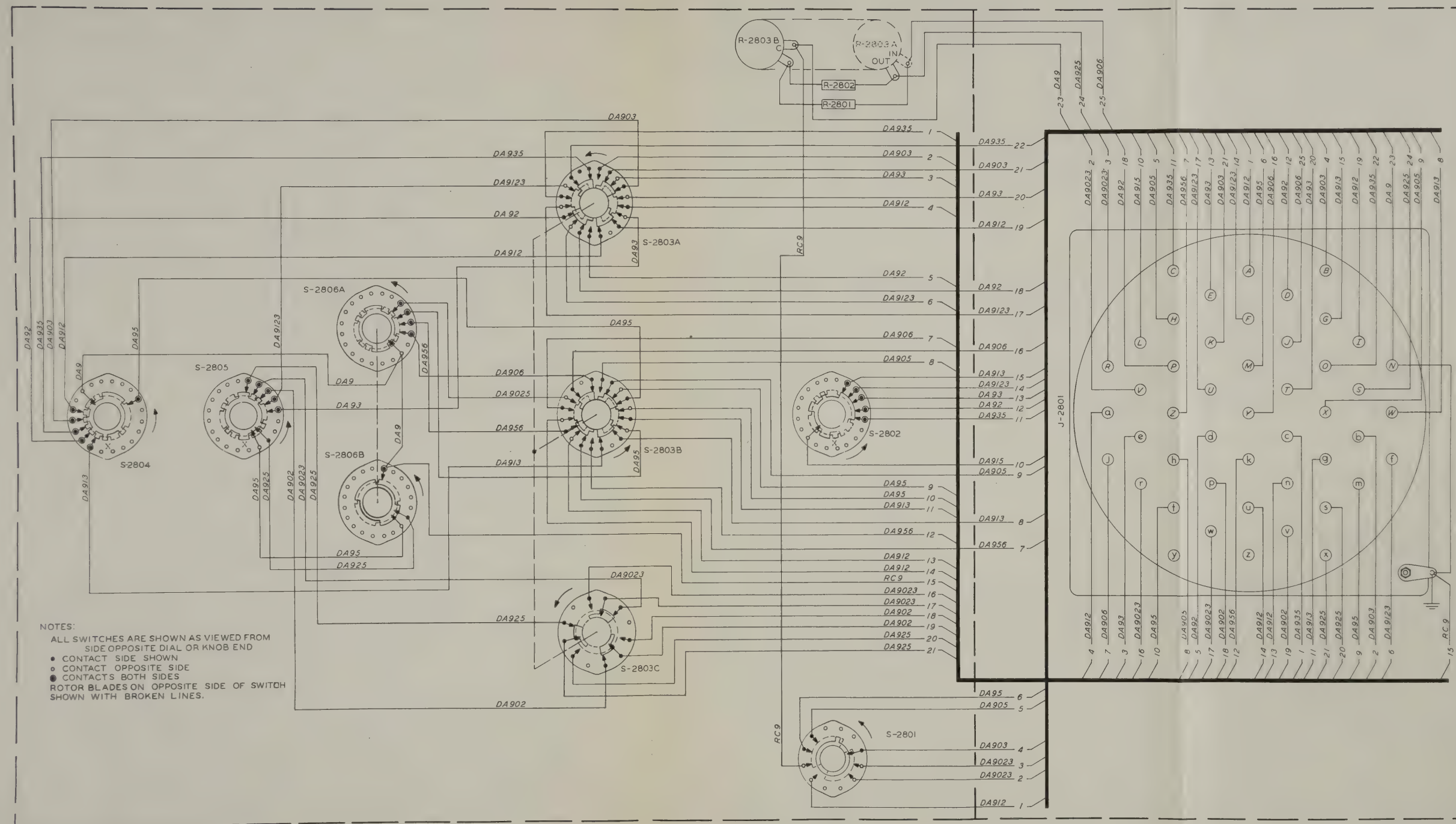


Figure 6-44. Radio Set Control C-912/ARC-27, Practical Wiring Diagram

RESTRICTED

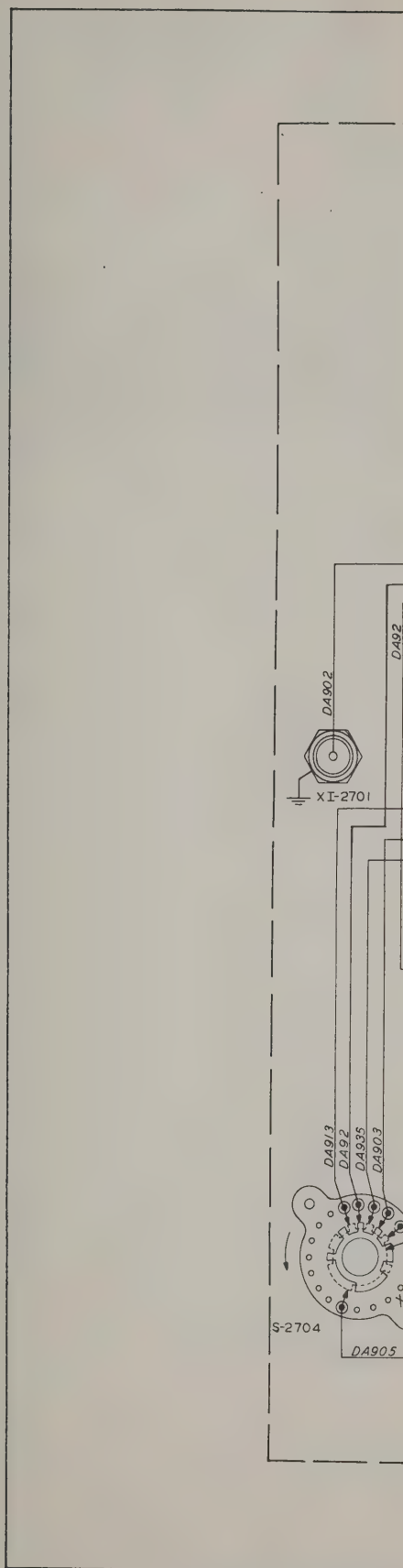


Figure 6-43. Radio S



RESTRICTED

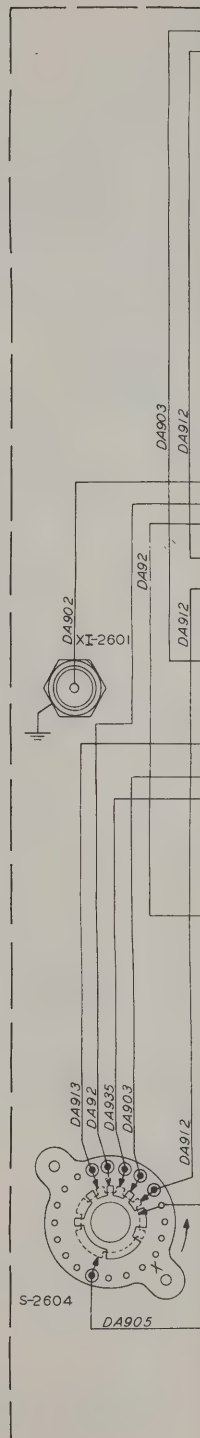
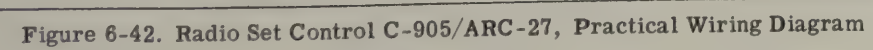


Figure 6-42. Radio S



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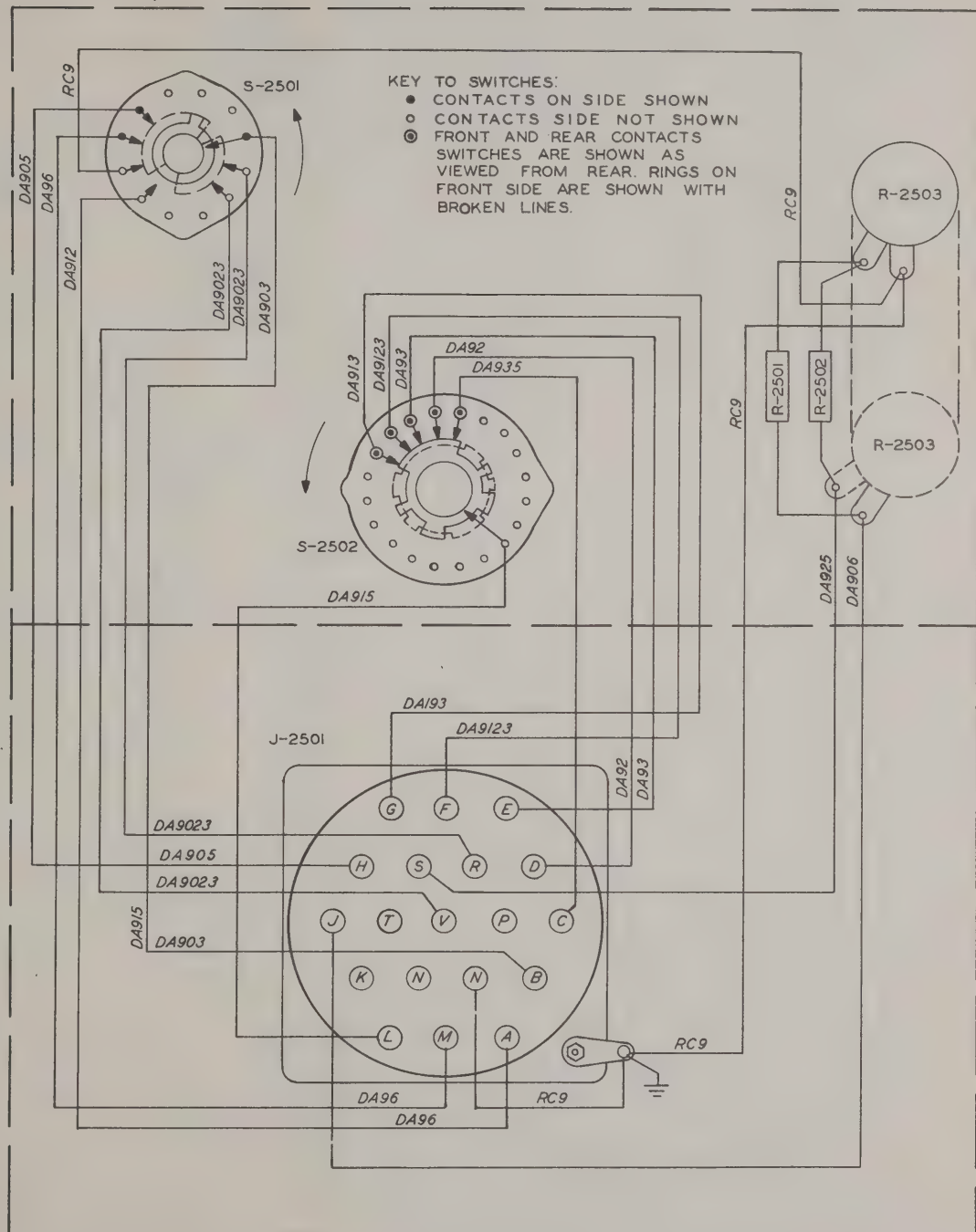


Figure 6-40. Radio Set Control C-911/ARC-27,
Practical Wiring Diagram

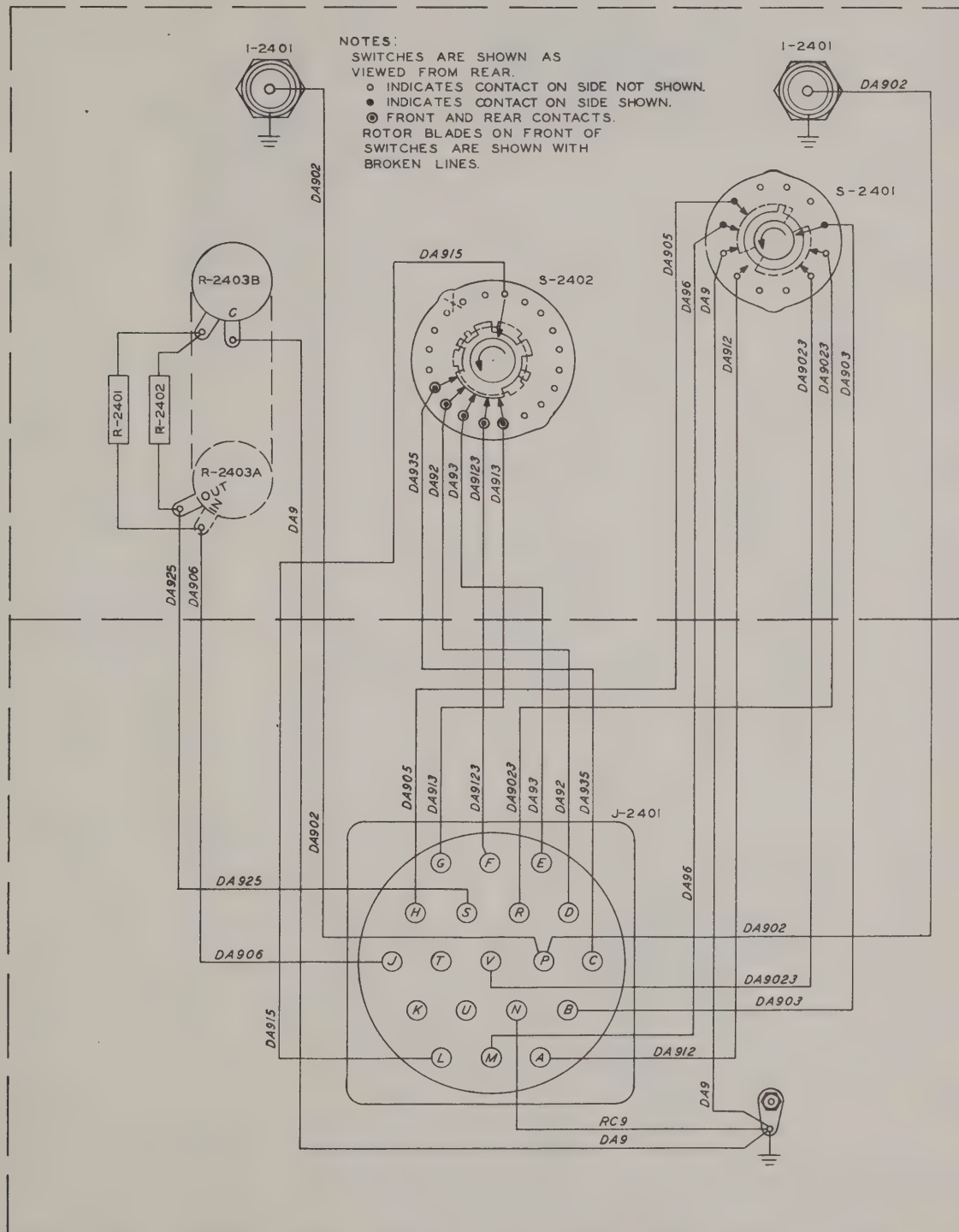


Figure 6-41. Radio Set Control C-868/ARC-27,
Practical Wiring Diagram



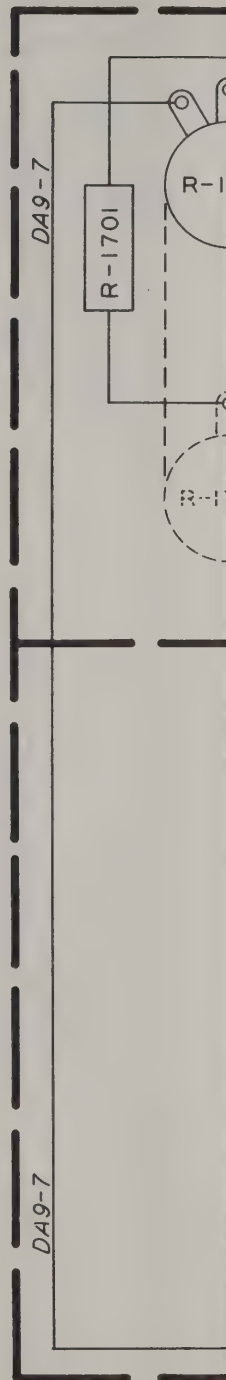


Figure 6-38. Radio Set Control C

RE

Revised 15 March 1953

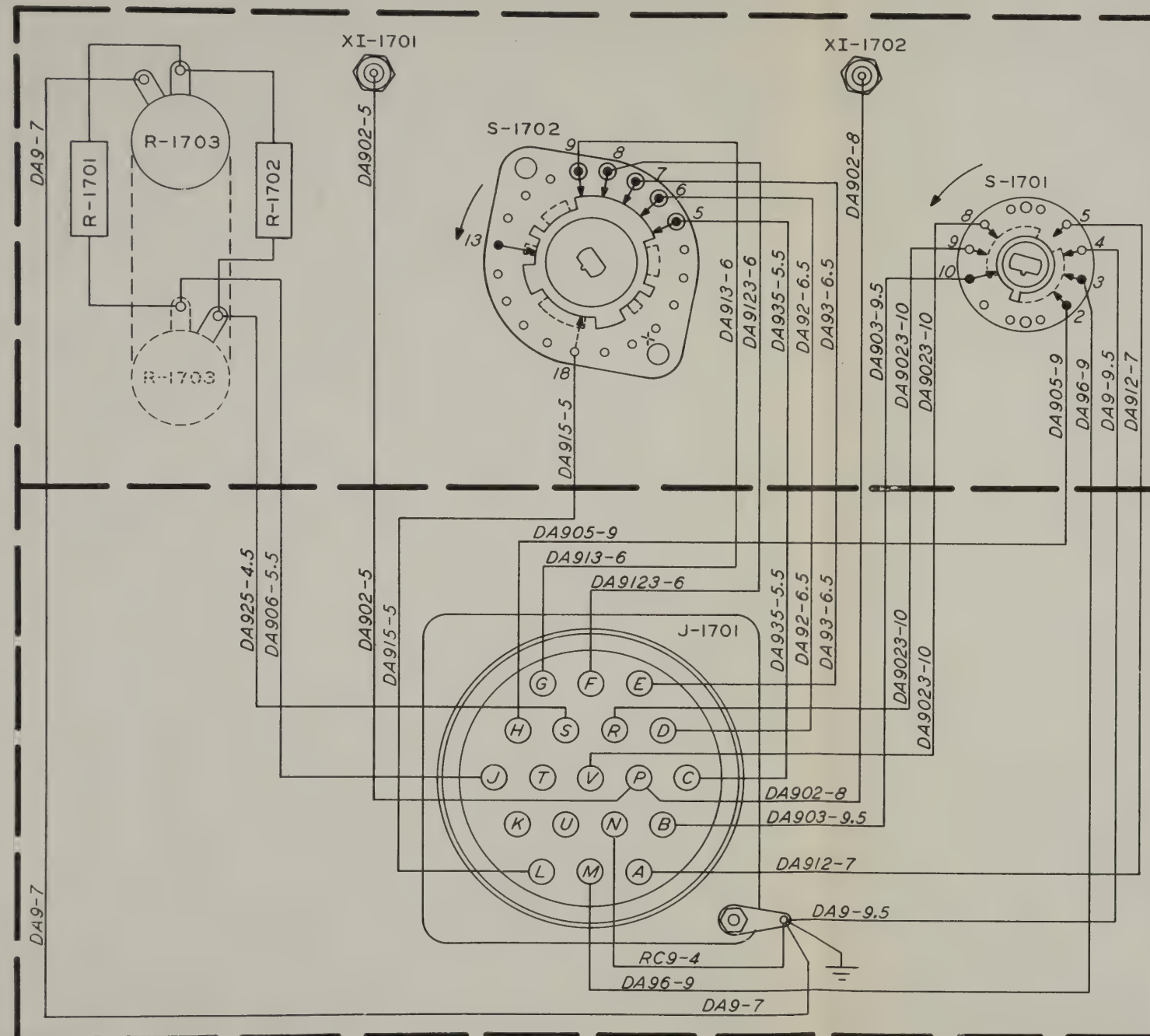


Figure 6-38. Radio Set Control C-628/ARC-27, Practical Wiring Diagram

RESTRICTED



Figure 6-37. Radio Set Co

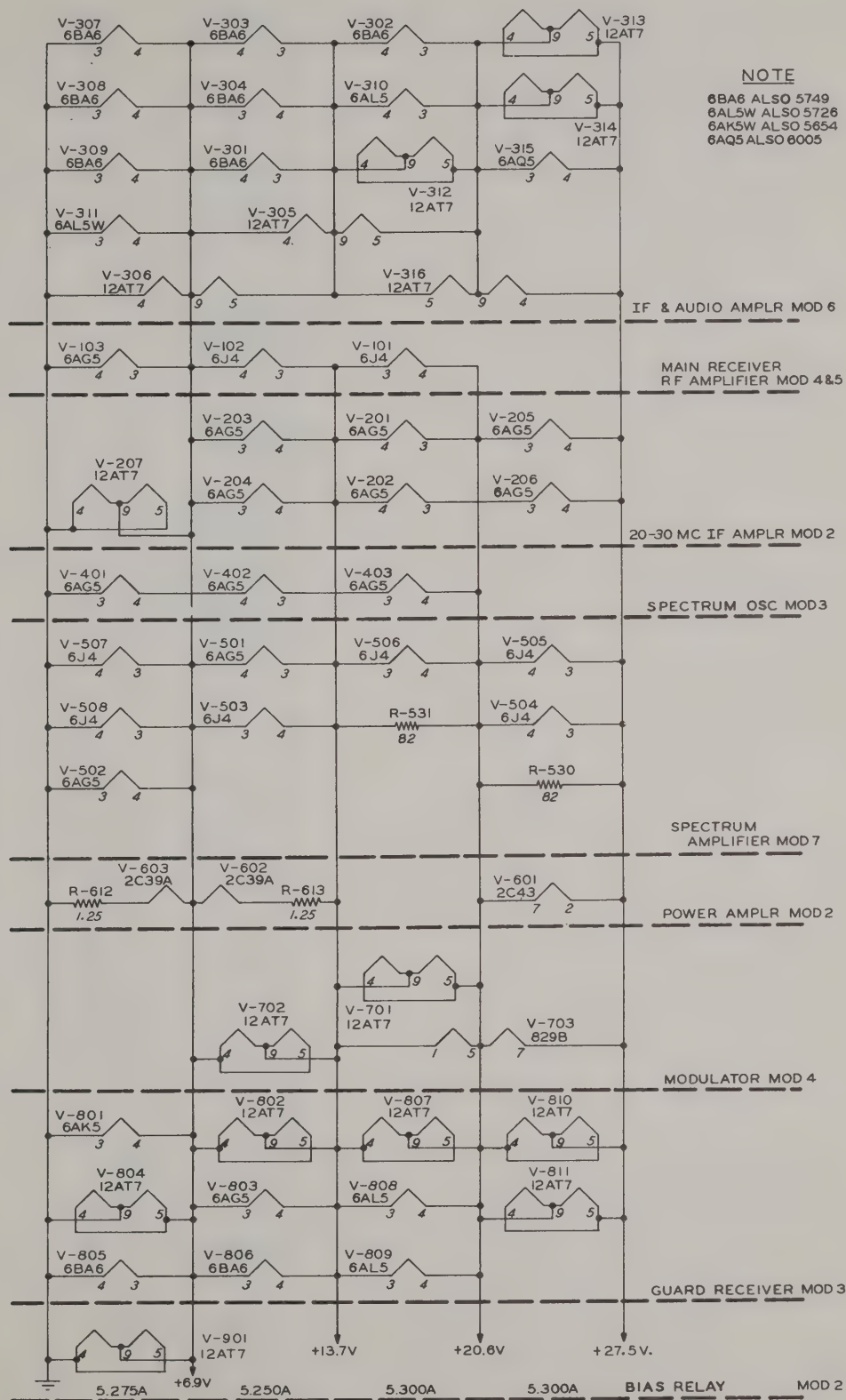


Figure 6-36. Receiver-Transmitter RT-178/ARC-27,
Filament Schematic Diagram

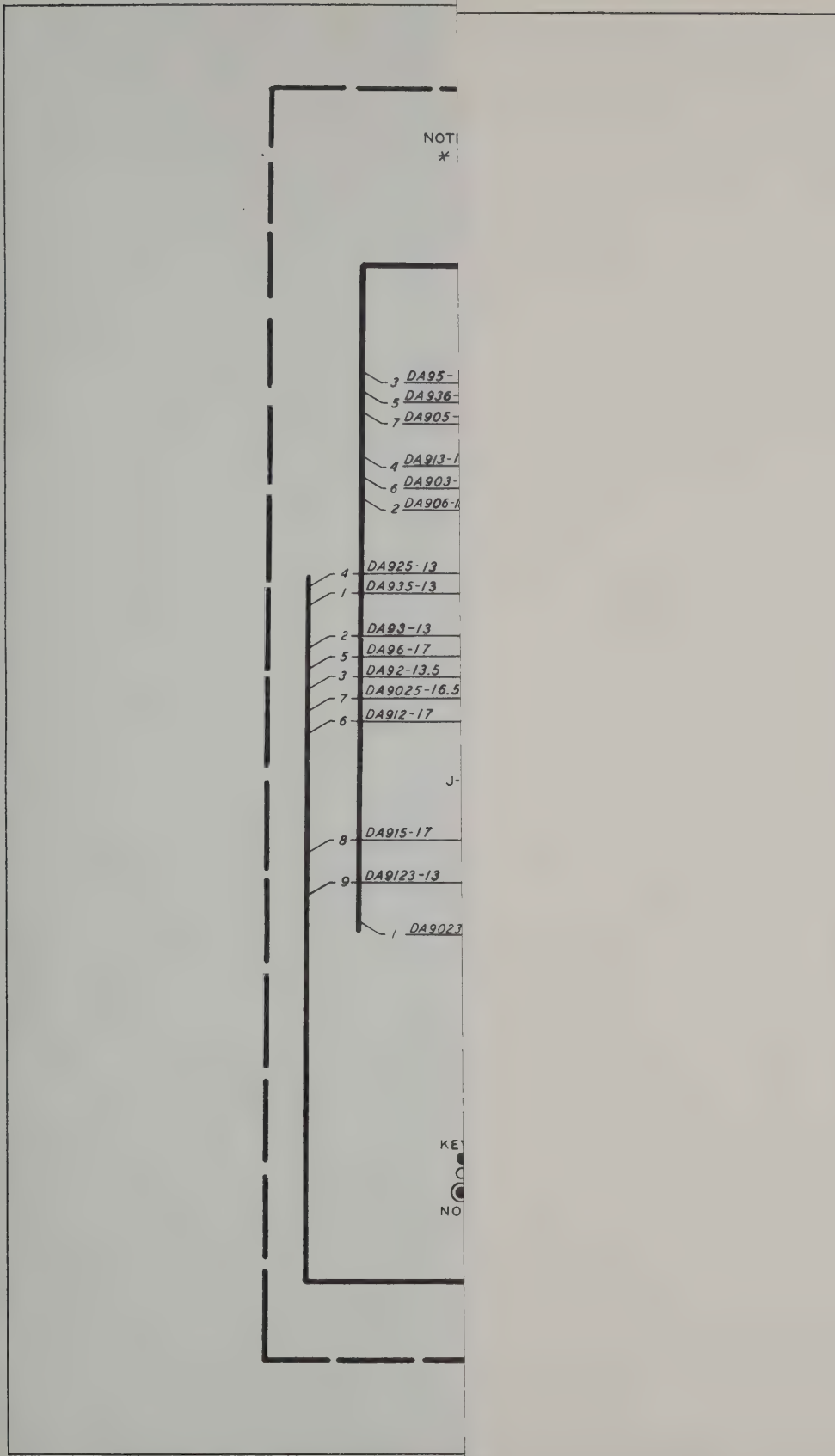


Figure 6-35. Receiver-Transmitter
Subassembly Practical Wiring

RES

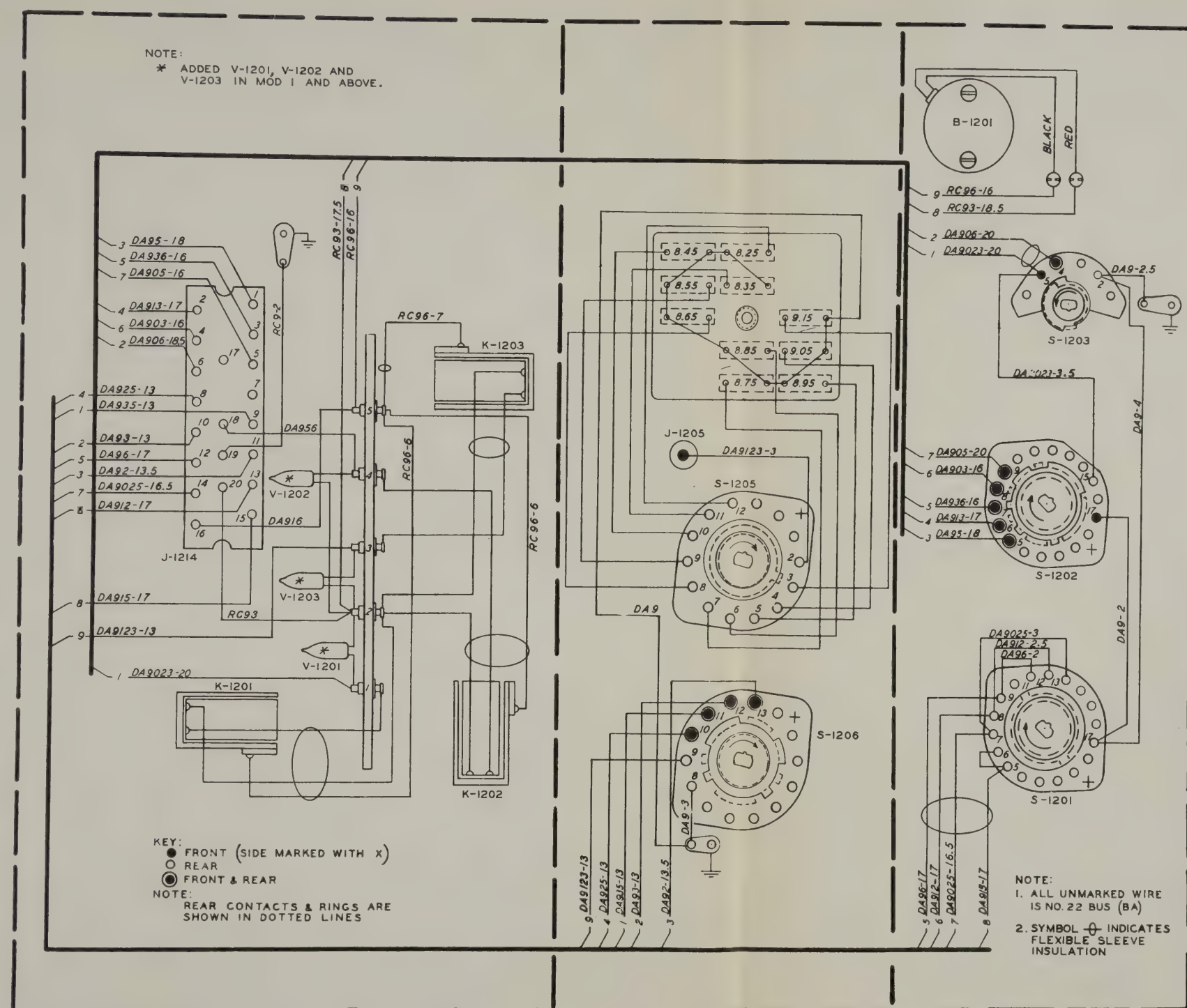


Figure 6-35. Receiver-Transmitter RT-178/ARC-27, Mechanical Tuning Drive Subassembly Practical Wiring Diagram, (Original and Mod. 1)

RESTRICTED





Figure 6-33A. Receiver
Chassis Subasse

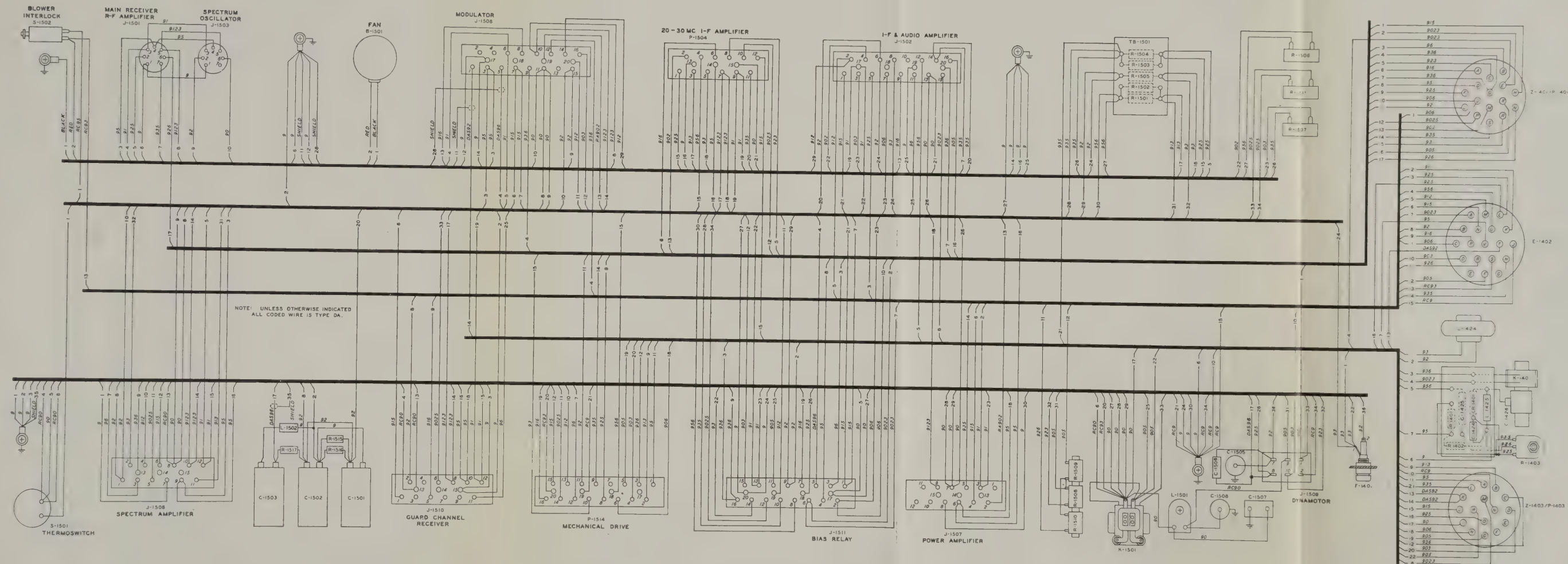


Figure 6-33A. Receiver-Transmitter RT-178/ARC-27, Meter Panel and Main Chassis Subassembly Practical Wiring Diagram (Mod. 5B, 5C)

RESTRICTED

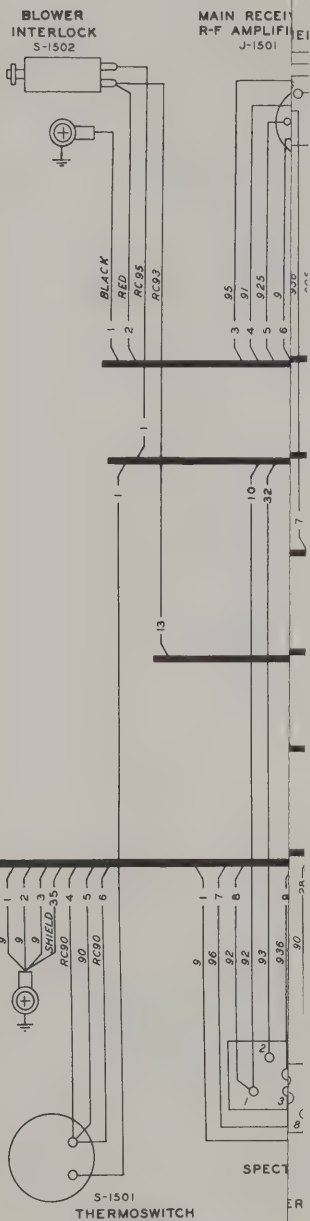


Figure 6-33. Receiver-Transmitter Subassembly Practice

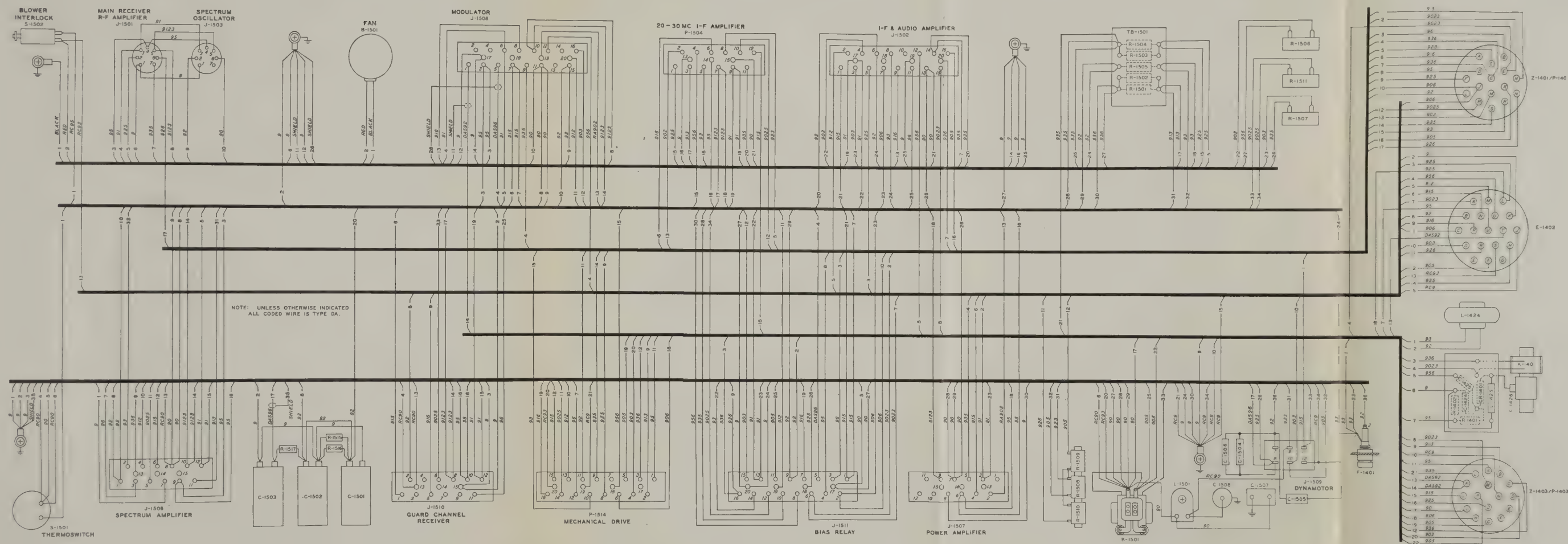
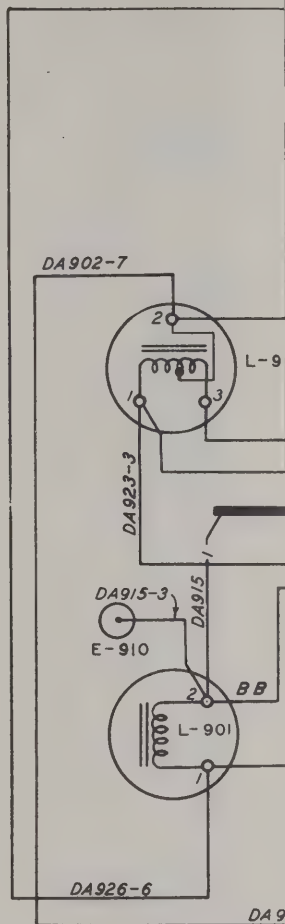


Figure 6-33. Receiver-Transmitter RT-178/ARC-27, Meter Panel and Main Chassis Subassembly Practical Wiring Diagram (Original, Mod. 2 and 5A)

RESTRICTED



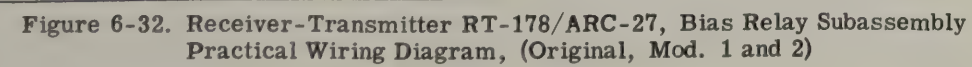
ALTERNATE P
FOR K-902
K-903 AND K-

(NUMBERS ON WIRES AT P
CORRESPOND WITH NUMBER
TERMINALS TO WHICH TH
ON DIAGRAM BELOW.)



Figure 6-32. Receiver-Transmitter
Practical Wiring Diagram

RI



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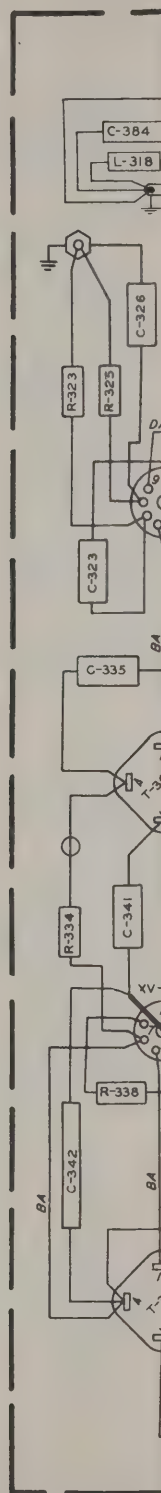


Figure 6-29B. Receiver
Subasse

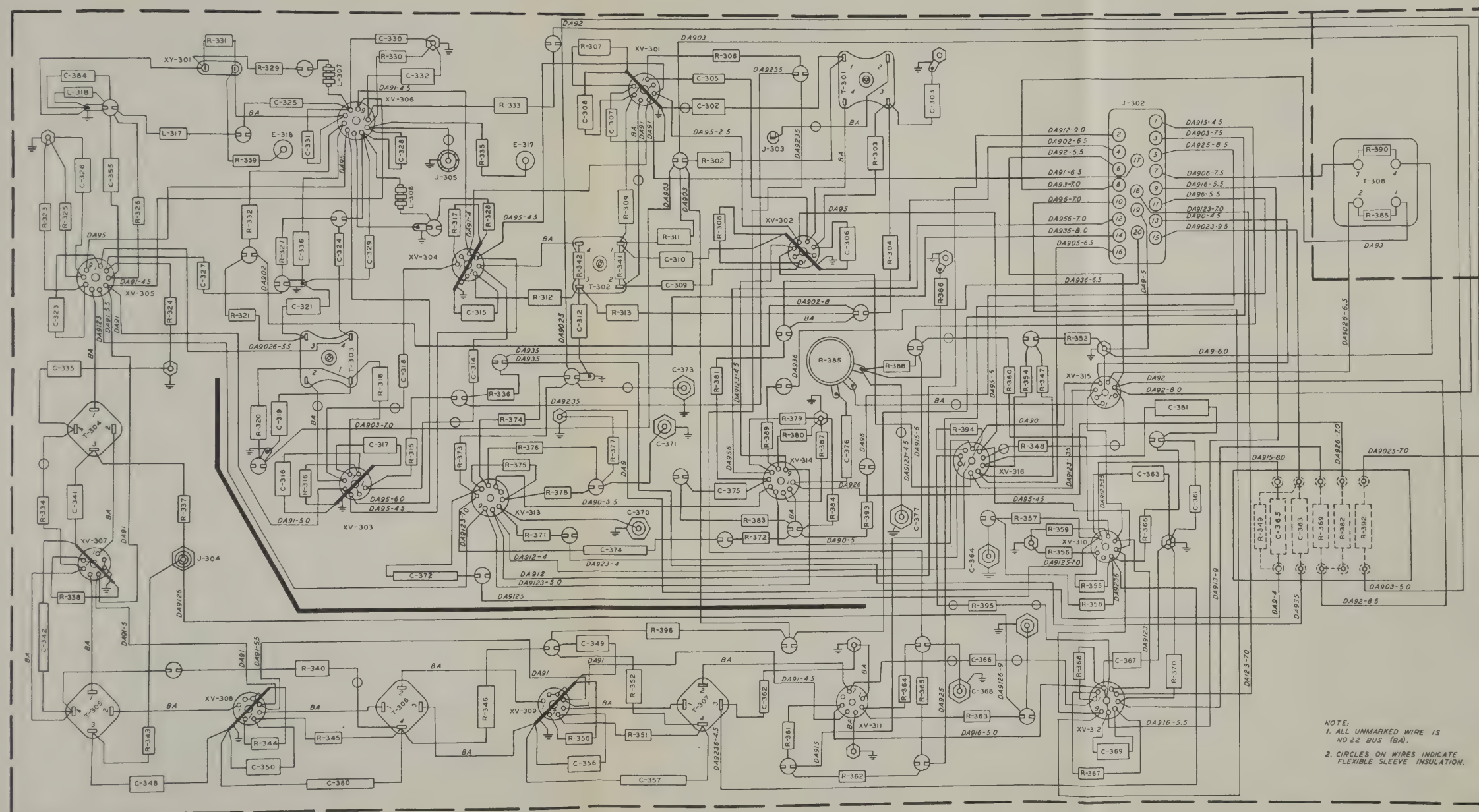


Figure 6-29B. Receiver-Transmitter RT-178/ARC-27, I-F and Audio Amplifier Subassembly Practical Wiring Diagram (Mod. 4)

RESTRICTED

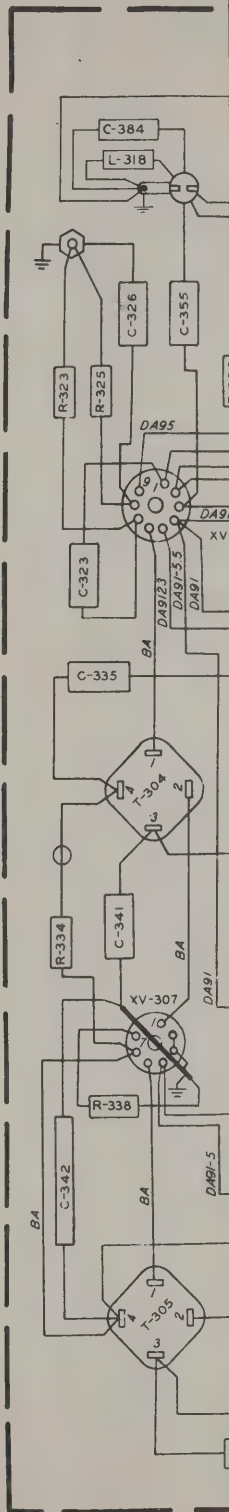


Figure 6-29A. Re
Amplifier Suba

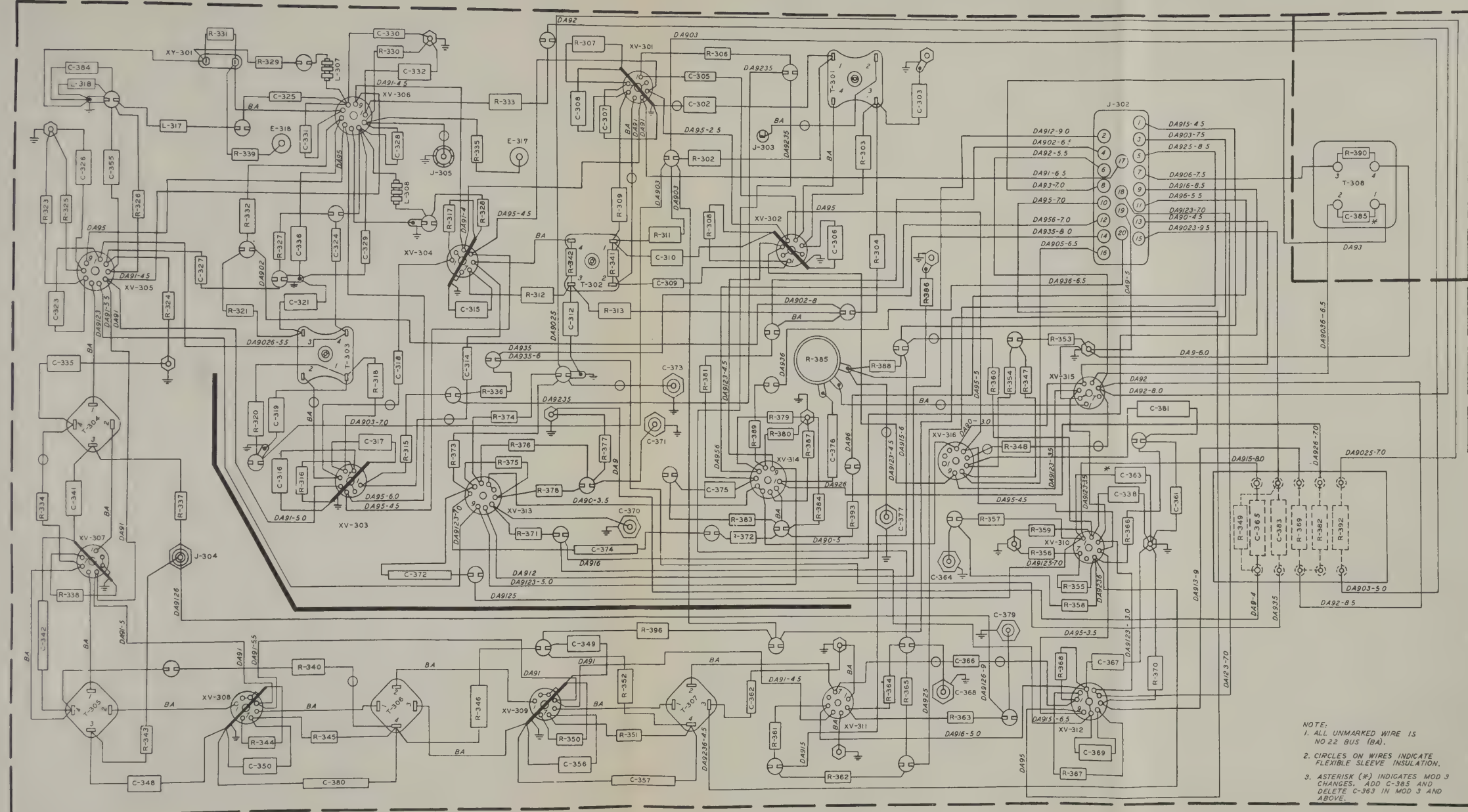
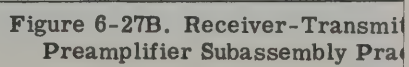


Figure 6-29A. Receiver-Transmitter RT-178/ARC-27, I-F and Audio Amplifier Subassembly Practical Wiring Diagram (Mod 1, 2 and 3)

RESTRICTED



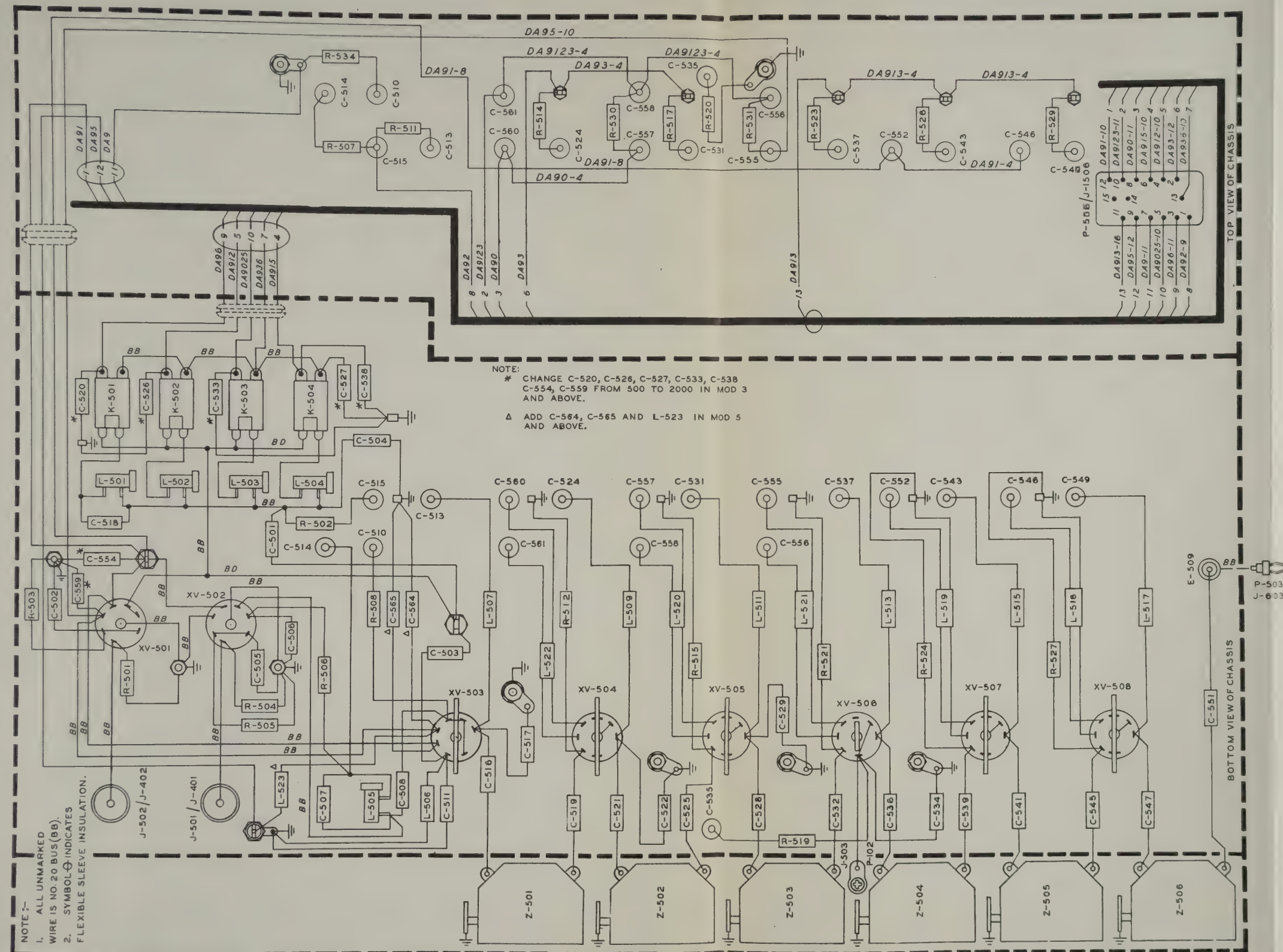


Figure 6-27B. Receiver-Transmitter RT-178/ARC-27, Spectrum Amplifier and Preamplifier Subassembly Practical Wiring Diagram (Mod. 3, 4, 5 and 6)

RESTRICTED

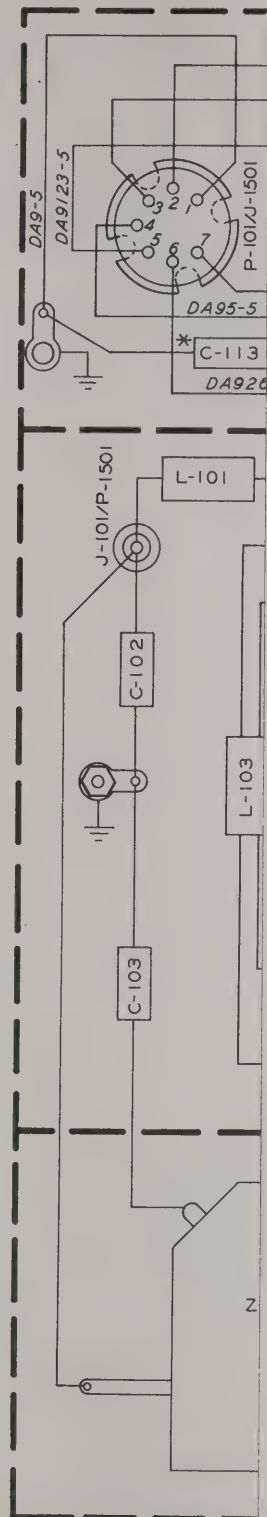


Figure 6-25. Receiver-Transmitter
Subassembly Practical W

R

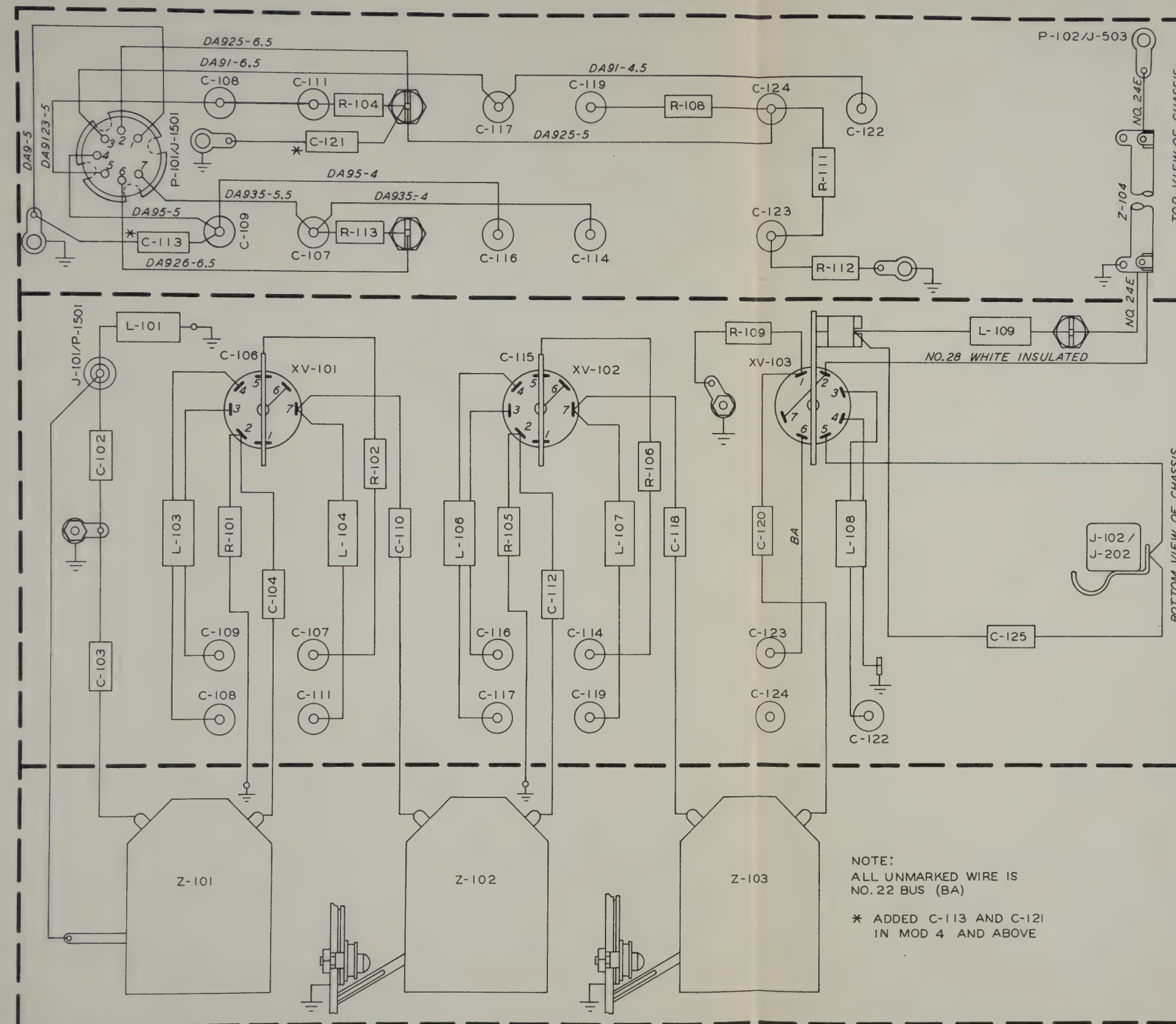


Figure 6-25. Receiver-Transmitter RT-178/ARC-27, Main Receiver R-F Amplifier Subassembly Practical Wiring Diagram, (Original, Mod. 3 and 4)

RESTRICTED

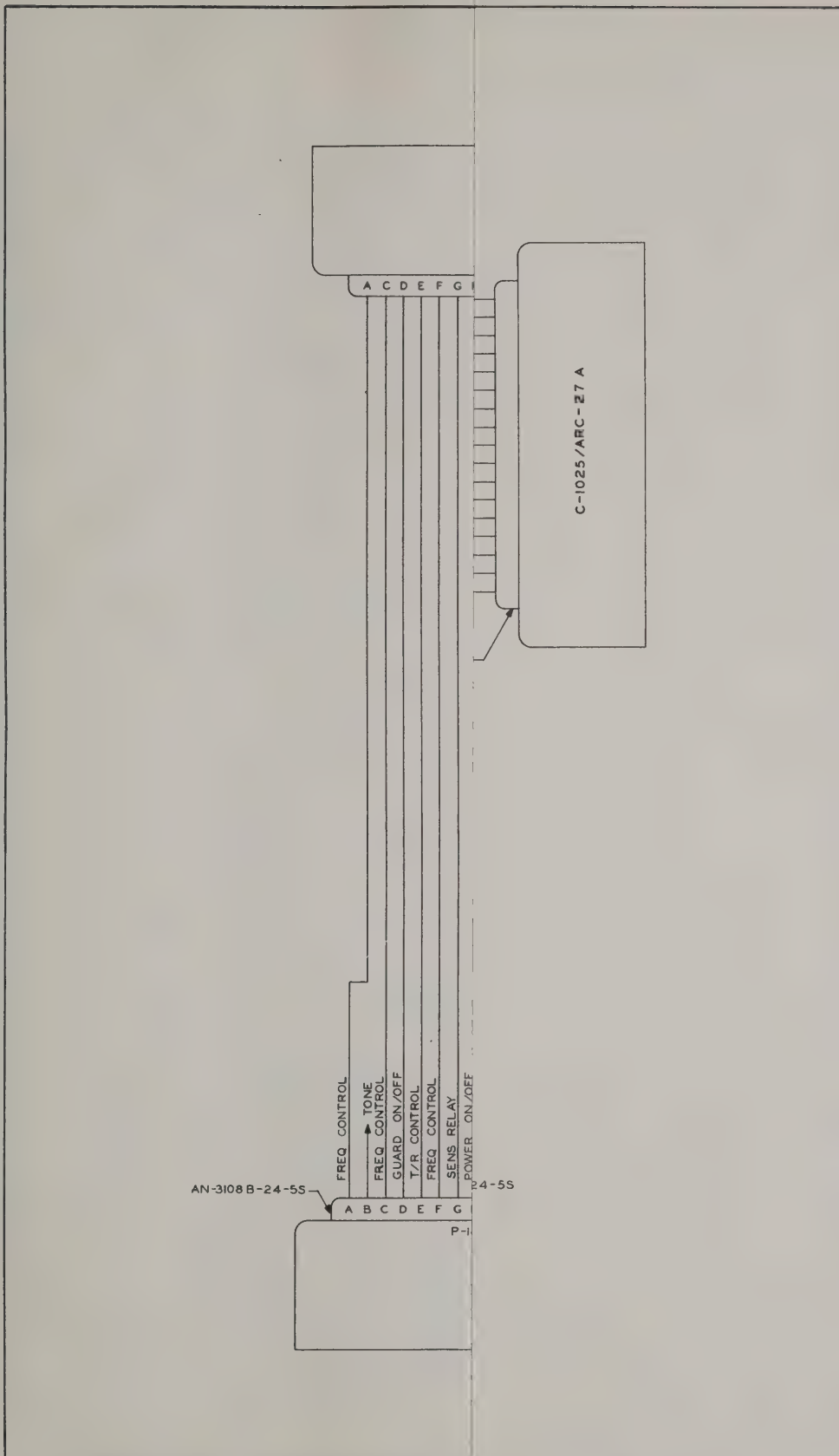
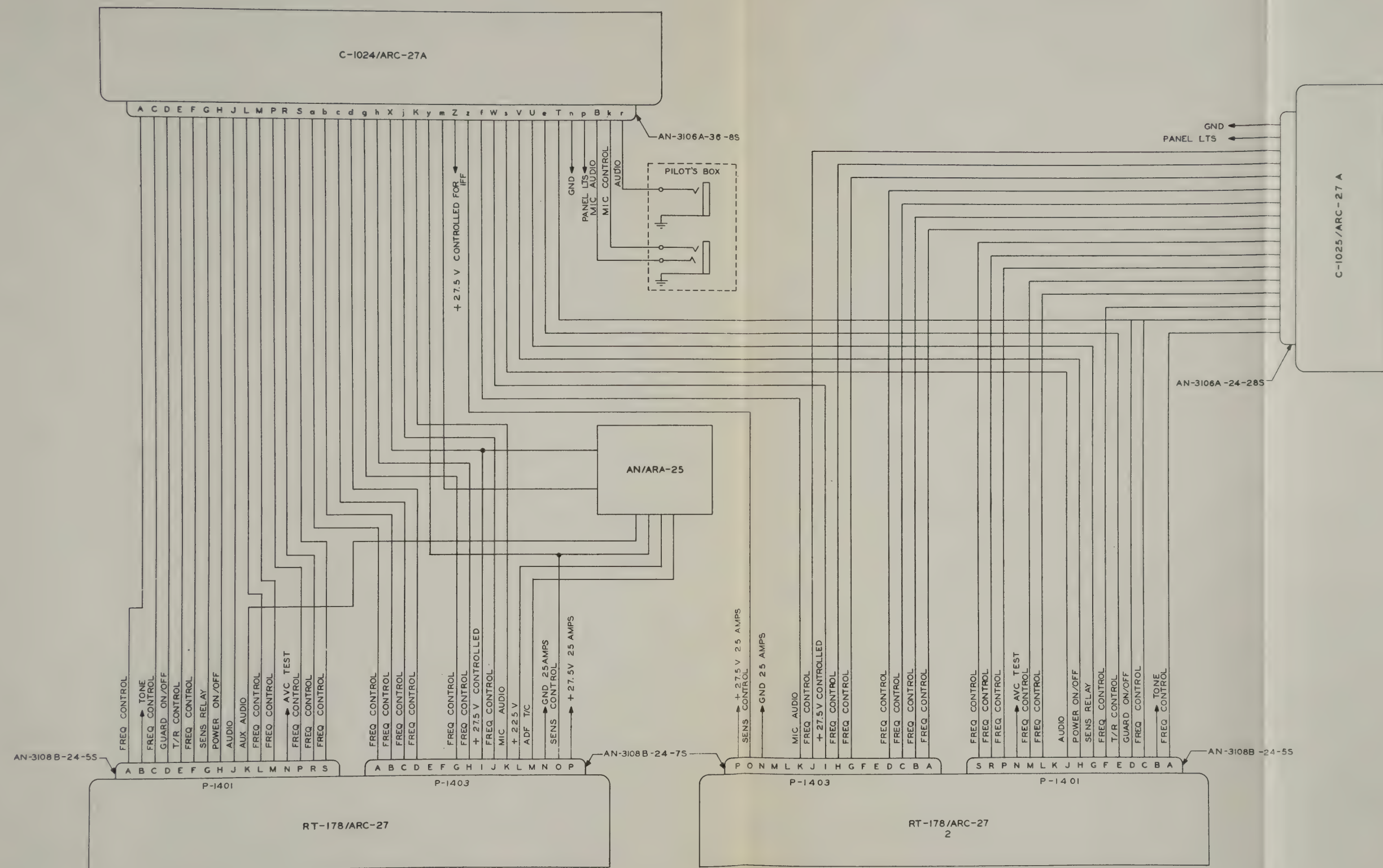


Figure 6-23B. Radio Sets AN/ARC-27
(With Radio Set Controls C-1)

RES



**Figure 6-23B. Radio Sets AN/ARC-27, Dual Installation, Interconnecting Cables
(With Radio Set Controls C-1024/ARC-27A and C-1025/ARC-27A)**

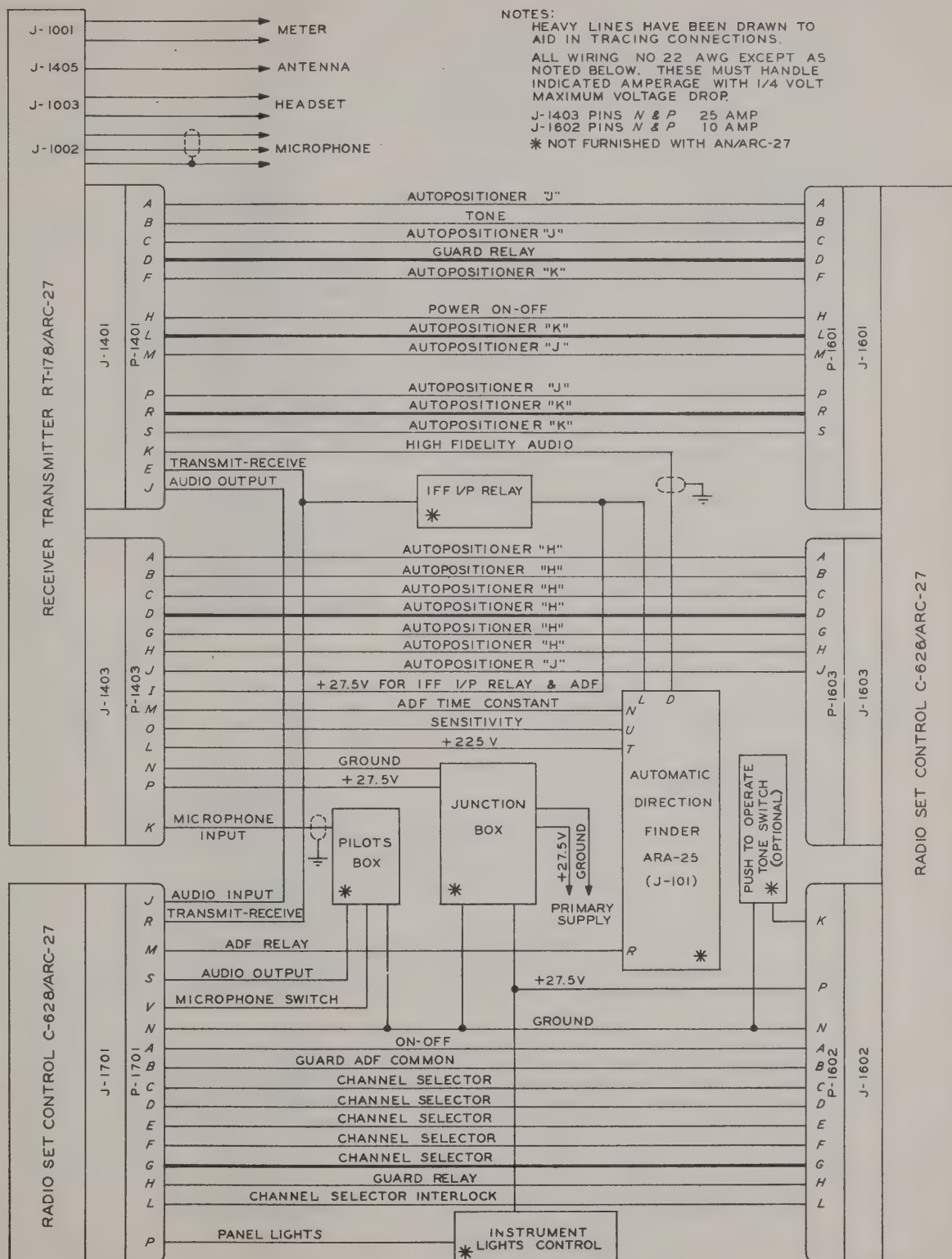


Figure 6-23. Radio Set AN/ARC-27, Interconnecting Cables
(With Radio Set Controls C-626/ARC-27 and C-628/ARC-27)

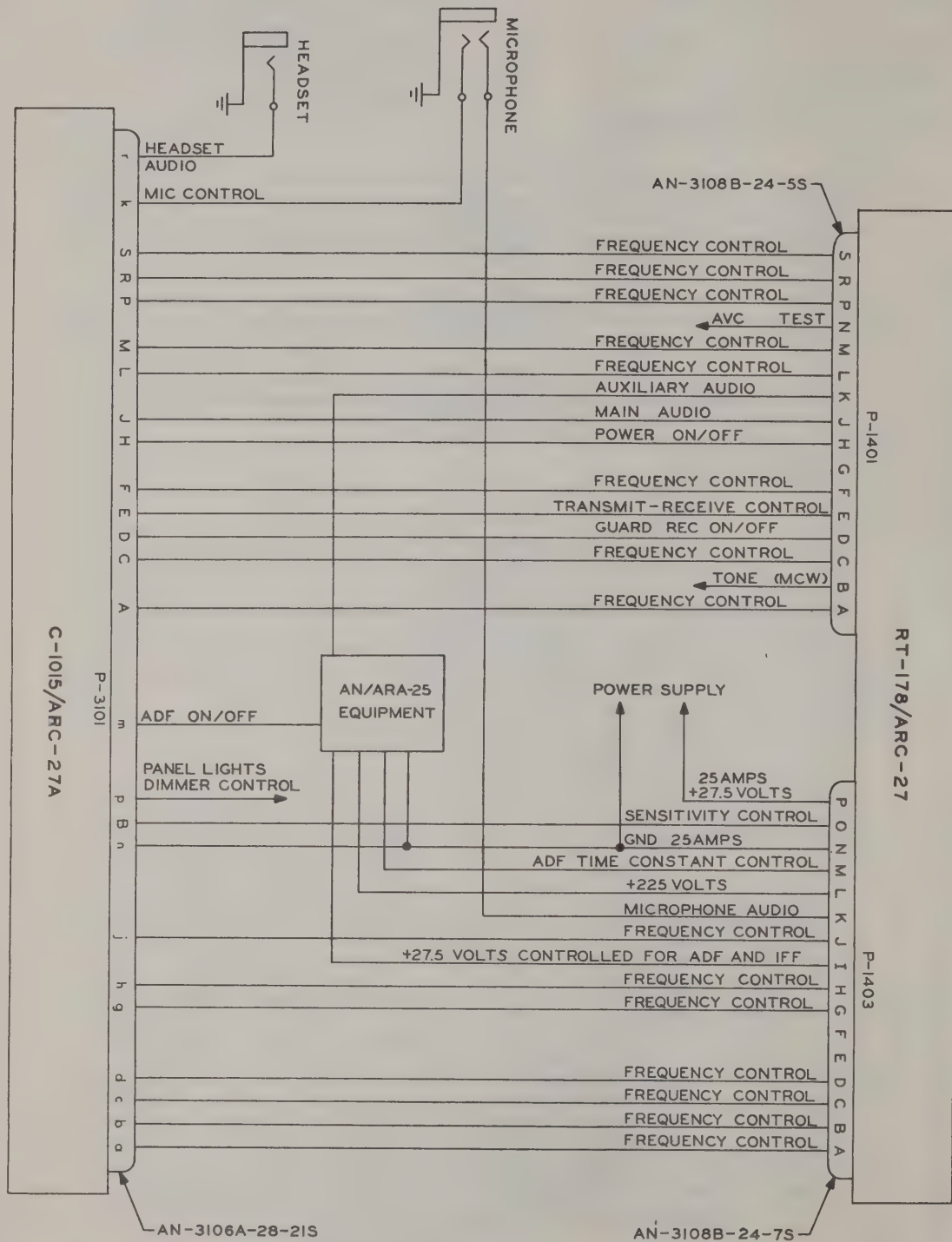


Figure 6-23A. Radio Set AN/ARC-27, Interconnecting Cables
(With Radio Set Control C-1015/ARC-27A)

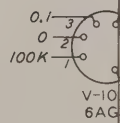
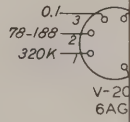
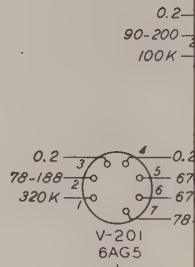


Figure 6-22. Recei

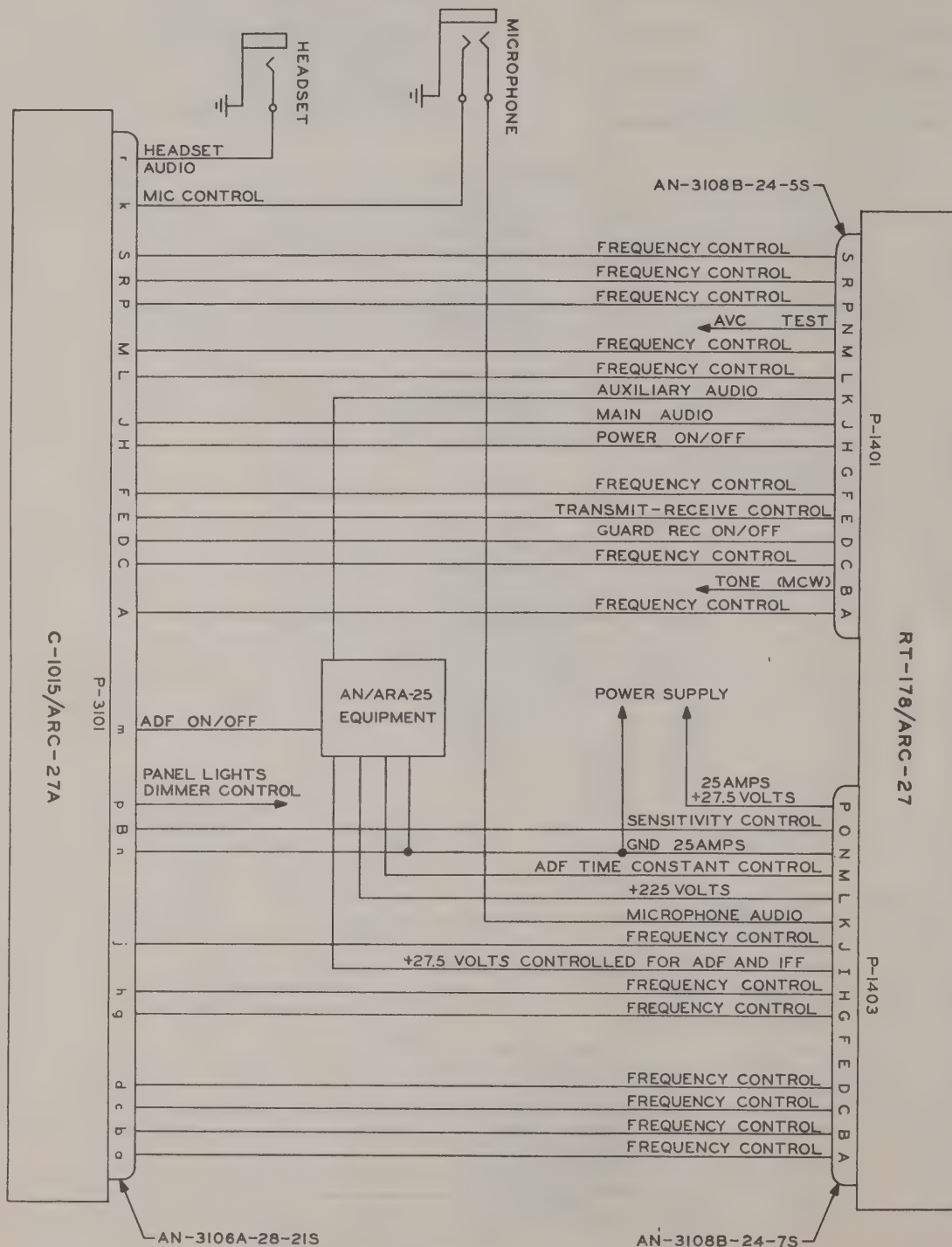
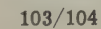
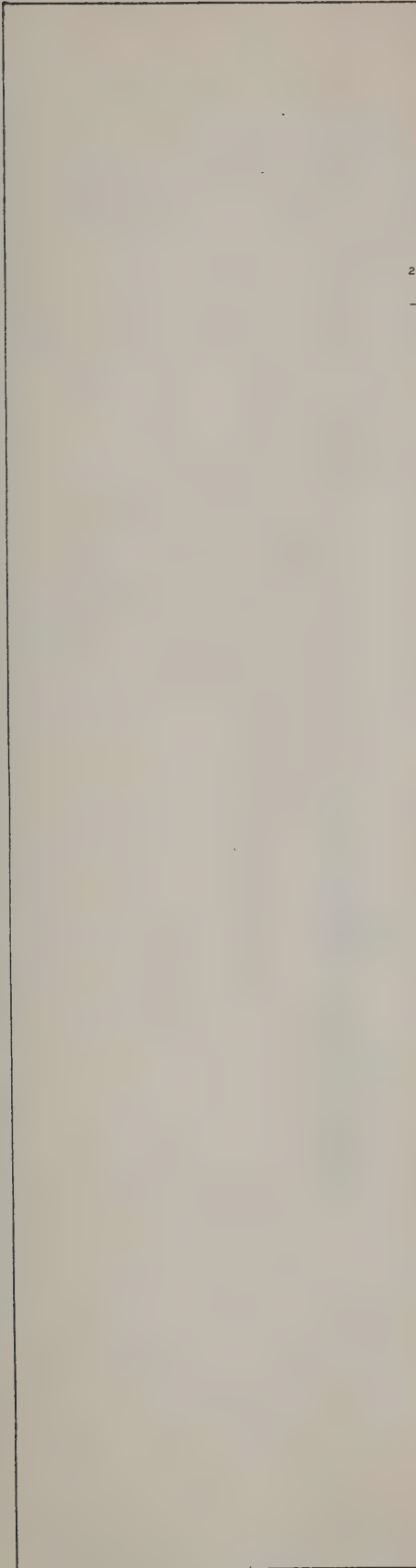


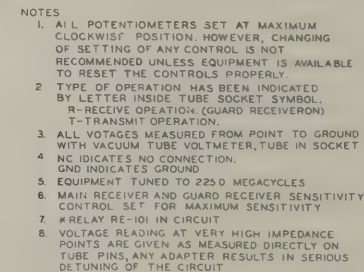
Figure 6-23A. Radio Set AN/ARC-27, Interconnecting Cables
(With Radio Set Control C-1015/ARC-27A)





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Figure 6-21. Rece



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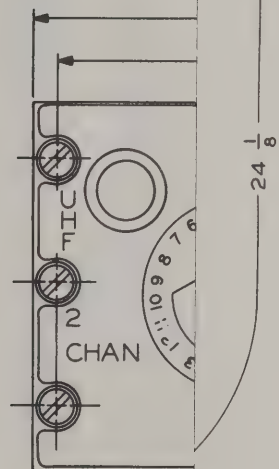


Figure 6-19L. Radio Set Control C-10

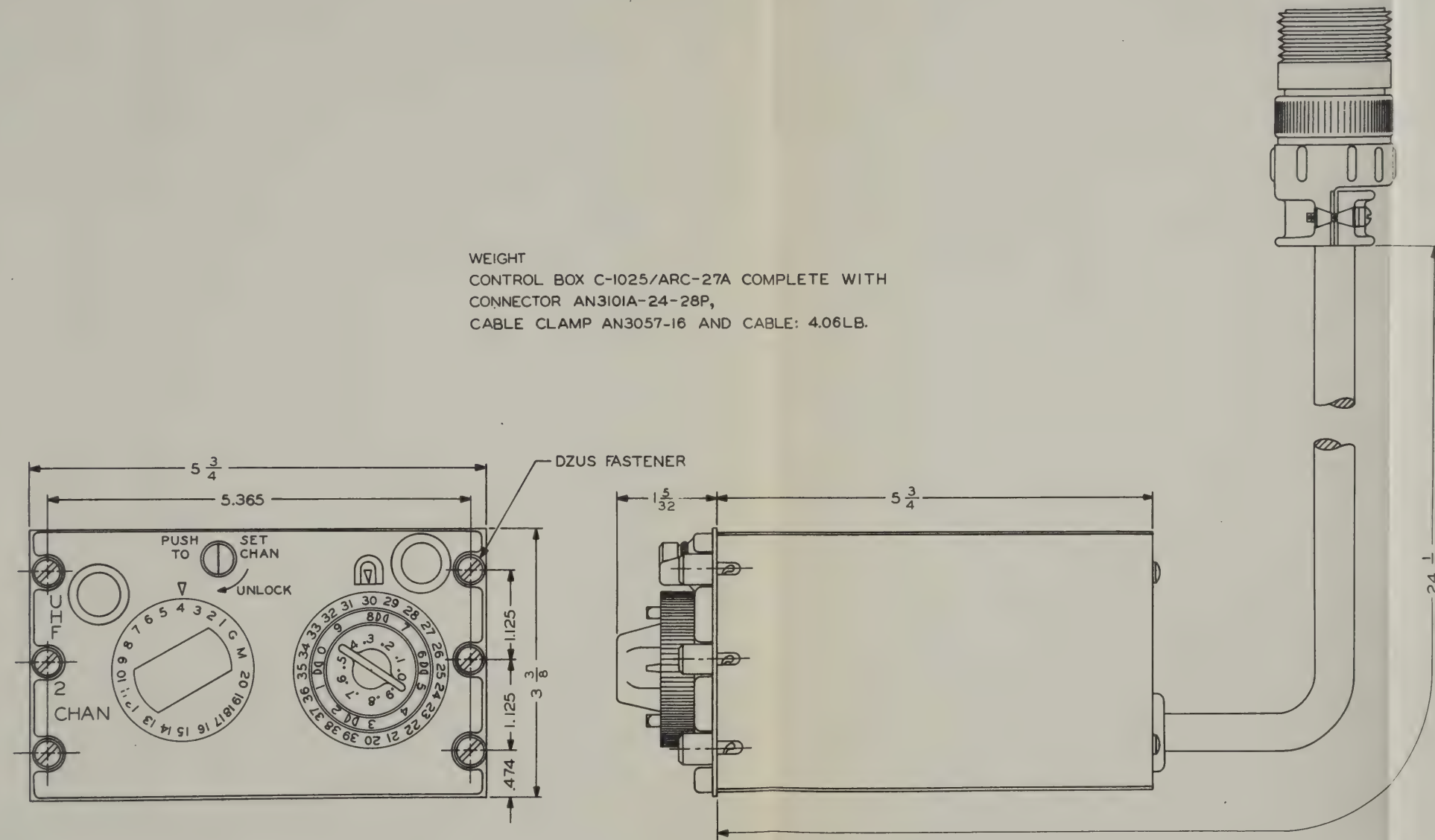


Figure 6-19L. Radio Set Control C-1025/ARC-27A, Outline and Mounting Dimensions

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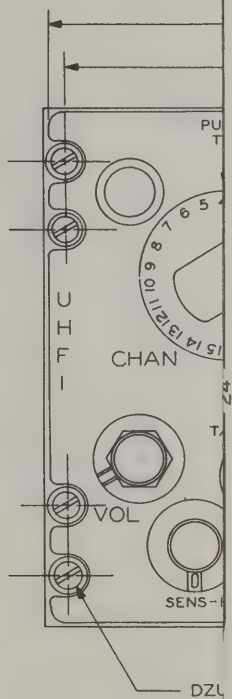
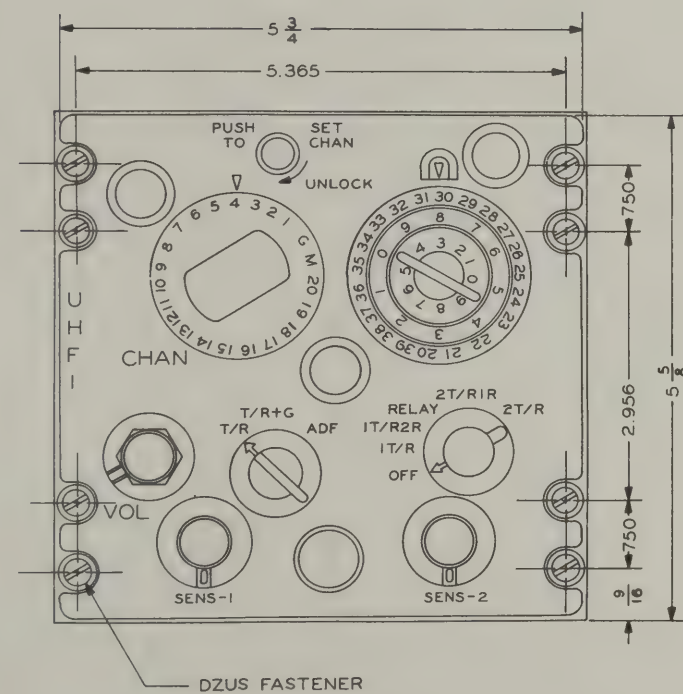


Figure 6-19K. Radio Set Control C-1024,

RES



WEIGHT
CONTROL BOX C-1024/ARC-27 COMPLETE WITH
CONNECTOR AN3101A-36-8P,
CABLE CLAMP AN3057-24 AND CABLE: 5.63LB.

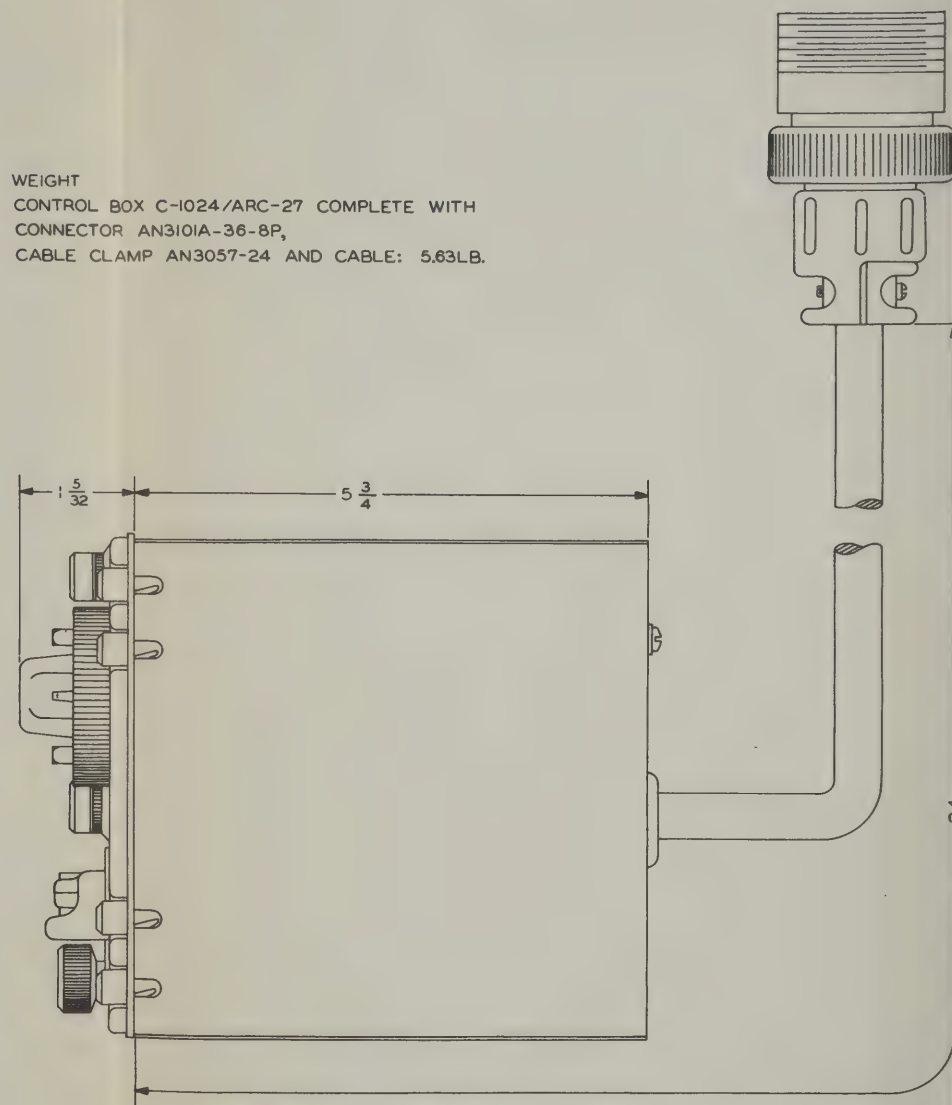


Figure 6-19K. Radio Set Control C-1024/ARC-27A, Outline and Mounting Dimensions

RESTRICTED

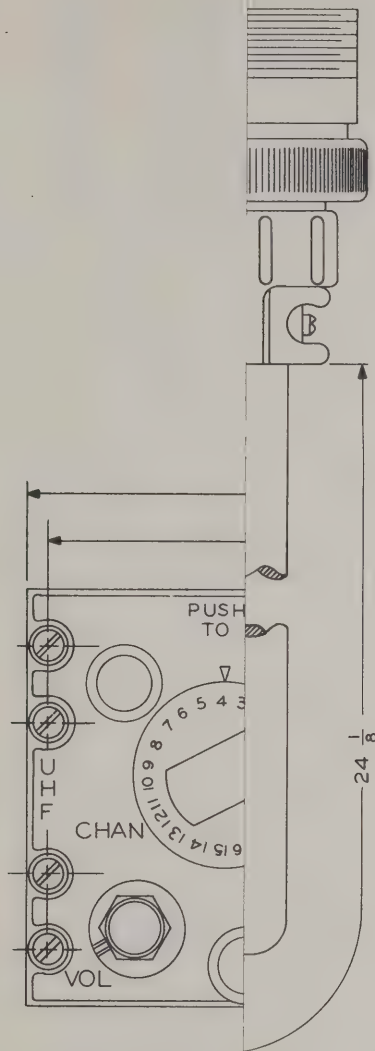


Figure 6-19J. Radio Set
and Microphone

RI

WEIGHT:
CONTROL BOX C-1015/ARC-27A COMPLETE WITH
CONNECTOR AN3101A-28-21P,
CABLE CLAMP AN3057-16 AND CABLE: 4.3 LB.

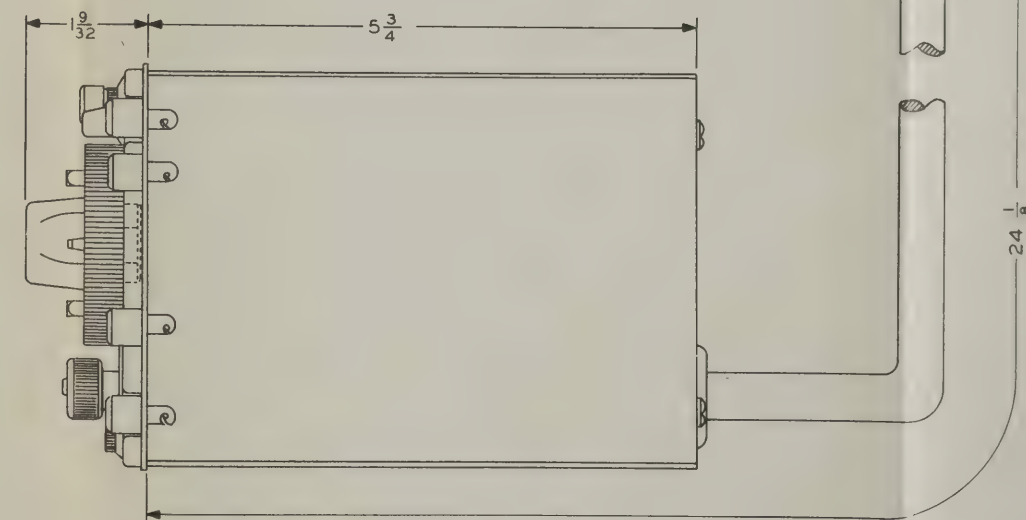
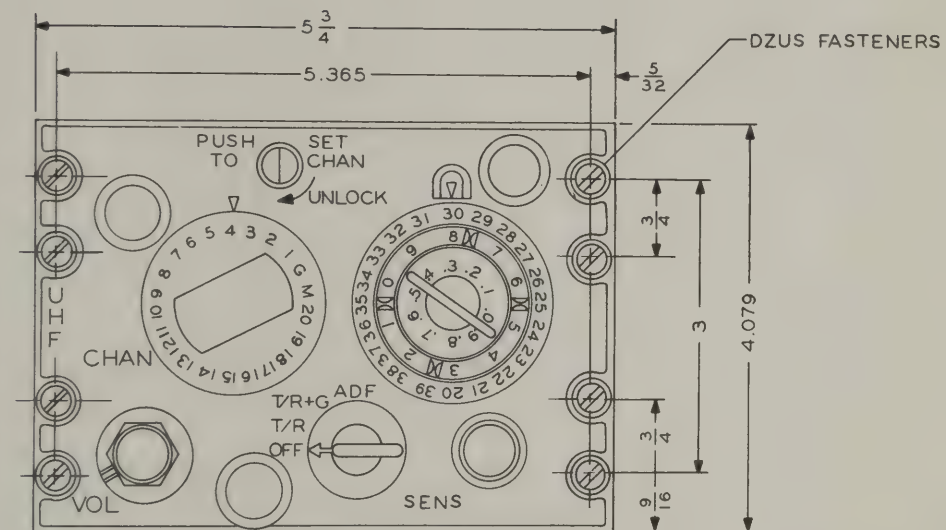


Figure 6-19J. Radio Set Control C-1015/ARC-27A, Outline and Mounting Dimensions

RESTRICTED

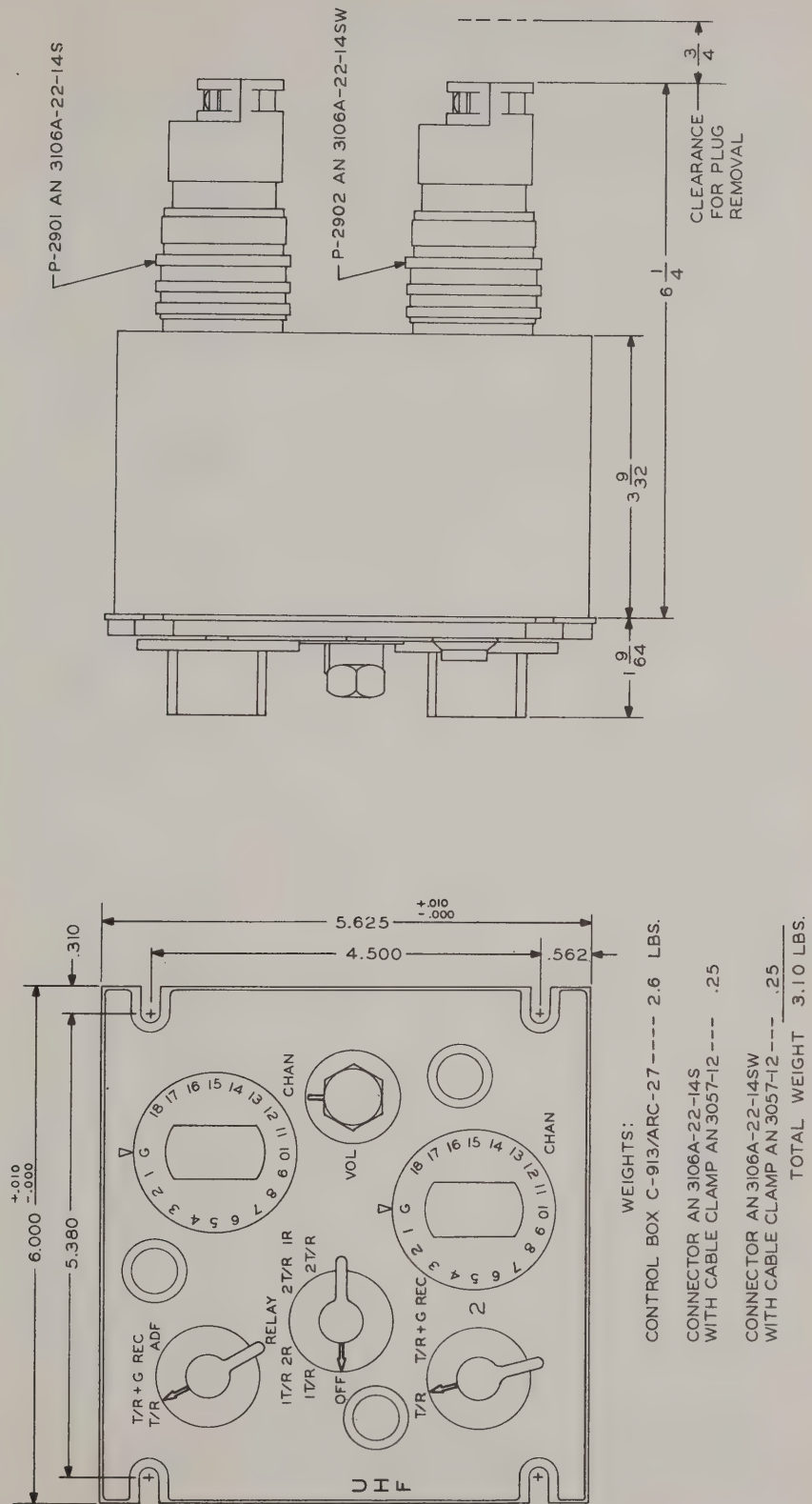


Figure 6-19H. Radio Set Control C-913/ARC-27,
Outline and Mounting Dimensions

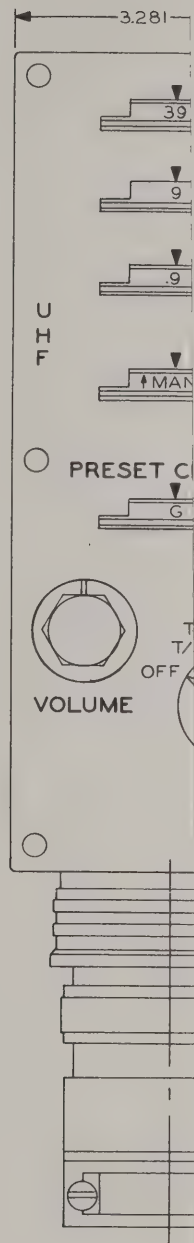


Figure 6-19F. Radio Set Control C-91

RM

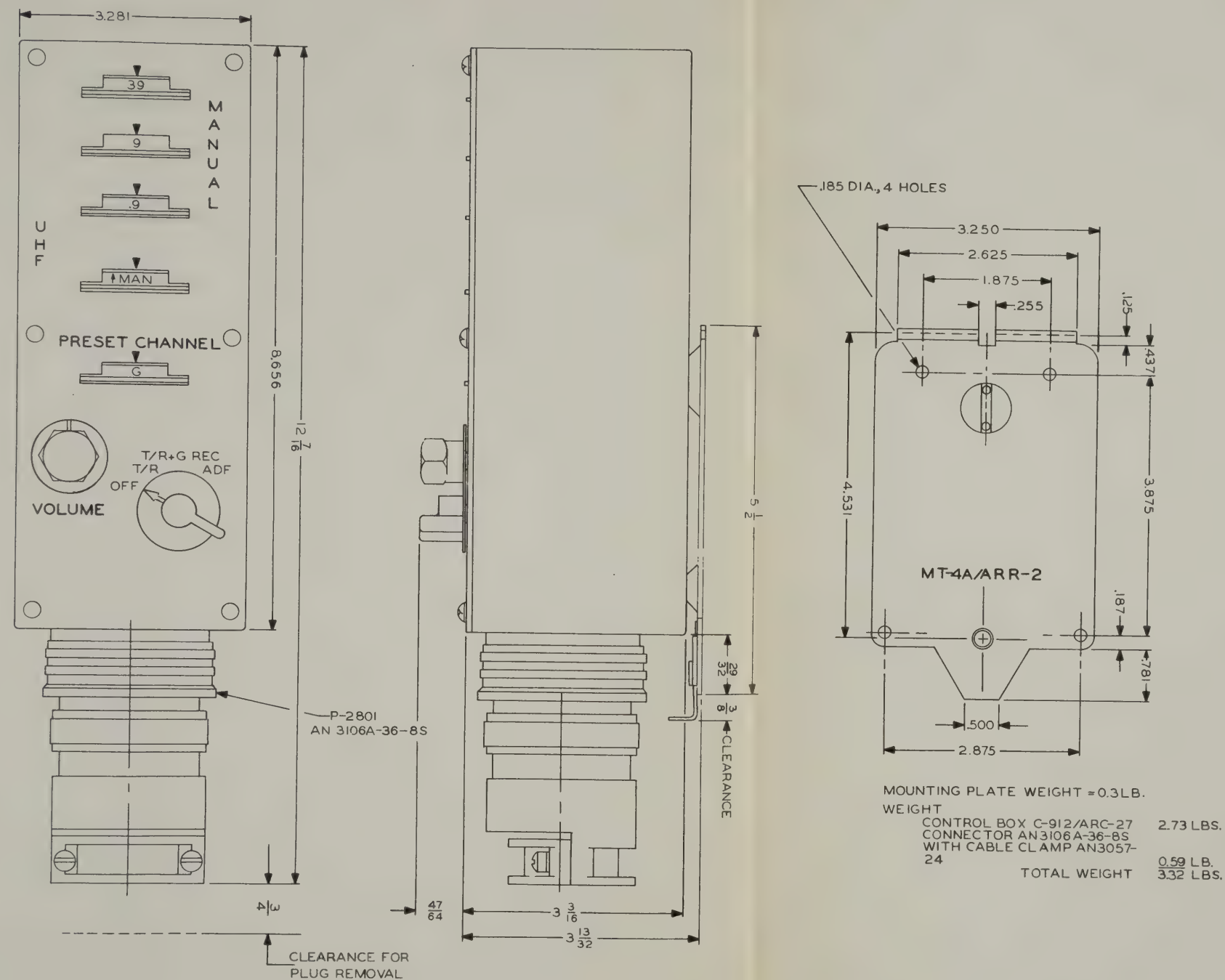


Figure 6-19F. Radio Set Control C-912/ARC-27, Outline and Mounting Dimensions

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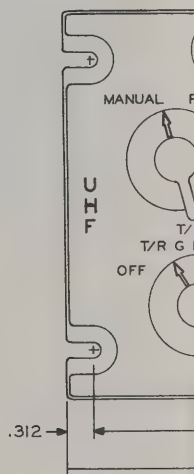
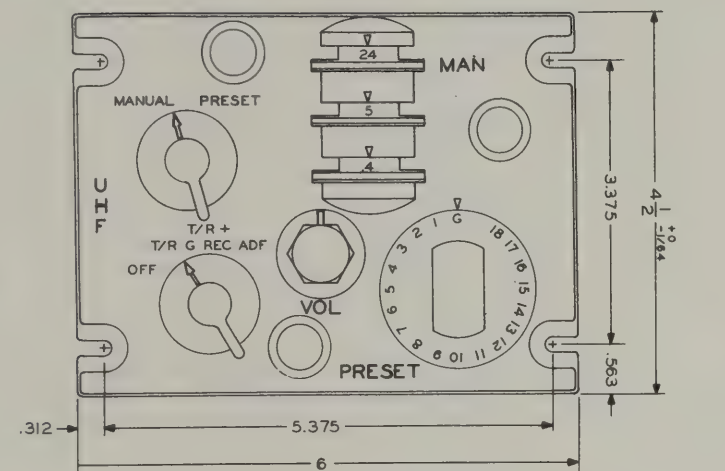


Figure 6-19E. Radio Set Control C-9

RE



WEIGHTS:
CONTROL BOX C-906/ARC-27 --- 2.430 LBS.
CONNECTOR AN 3106A-28-21S --- .348
WITH CABLE CLAMP AN 3057-16
CONNECTOR AN 3106A-22-14S --- .303
WITH CABLE CLAMP AN 3057-12
TOTAL WEIGHT 3.081 LBS.

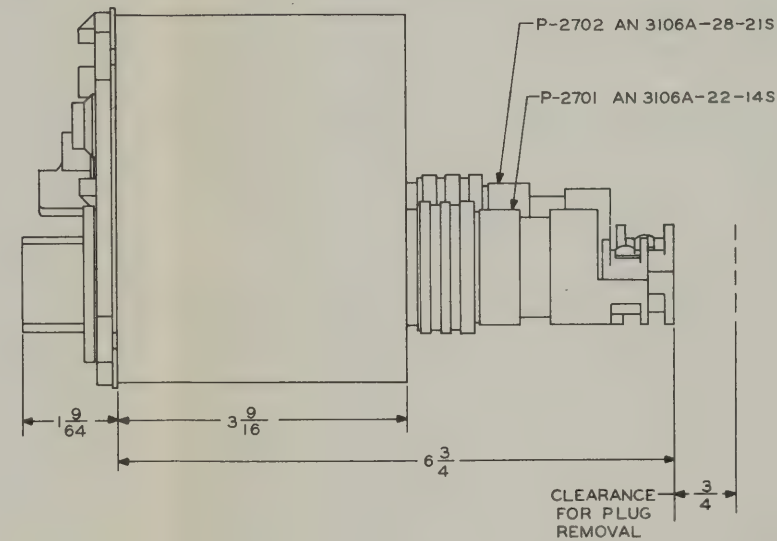


Figure 6-19E. Radio Set Control C-906/ARC-27, Outline and Mounting Dimensions

RESTRICTED



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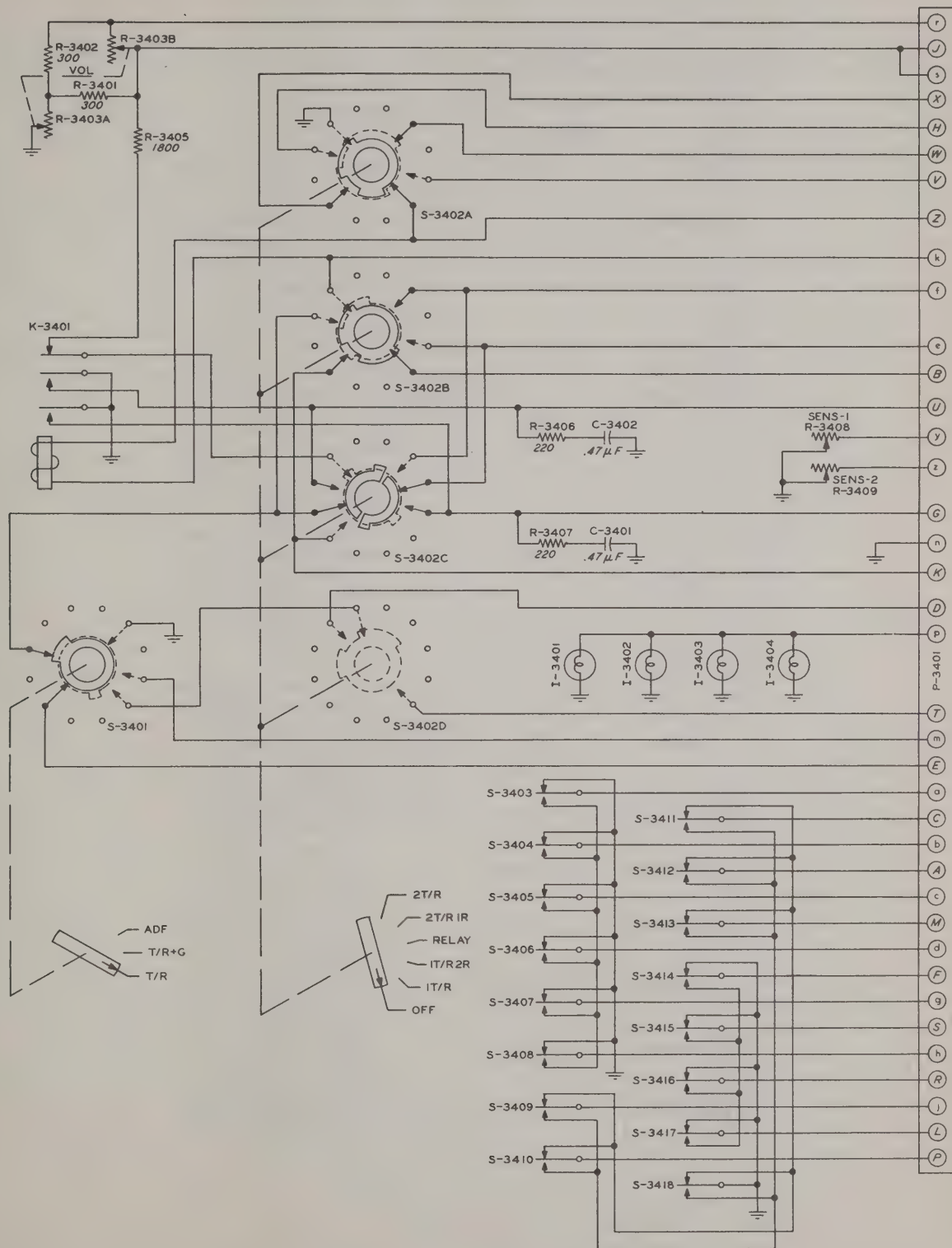


Figure 6-14K. Radio Set Control C-1024/ARC-27A, Schematic

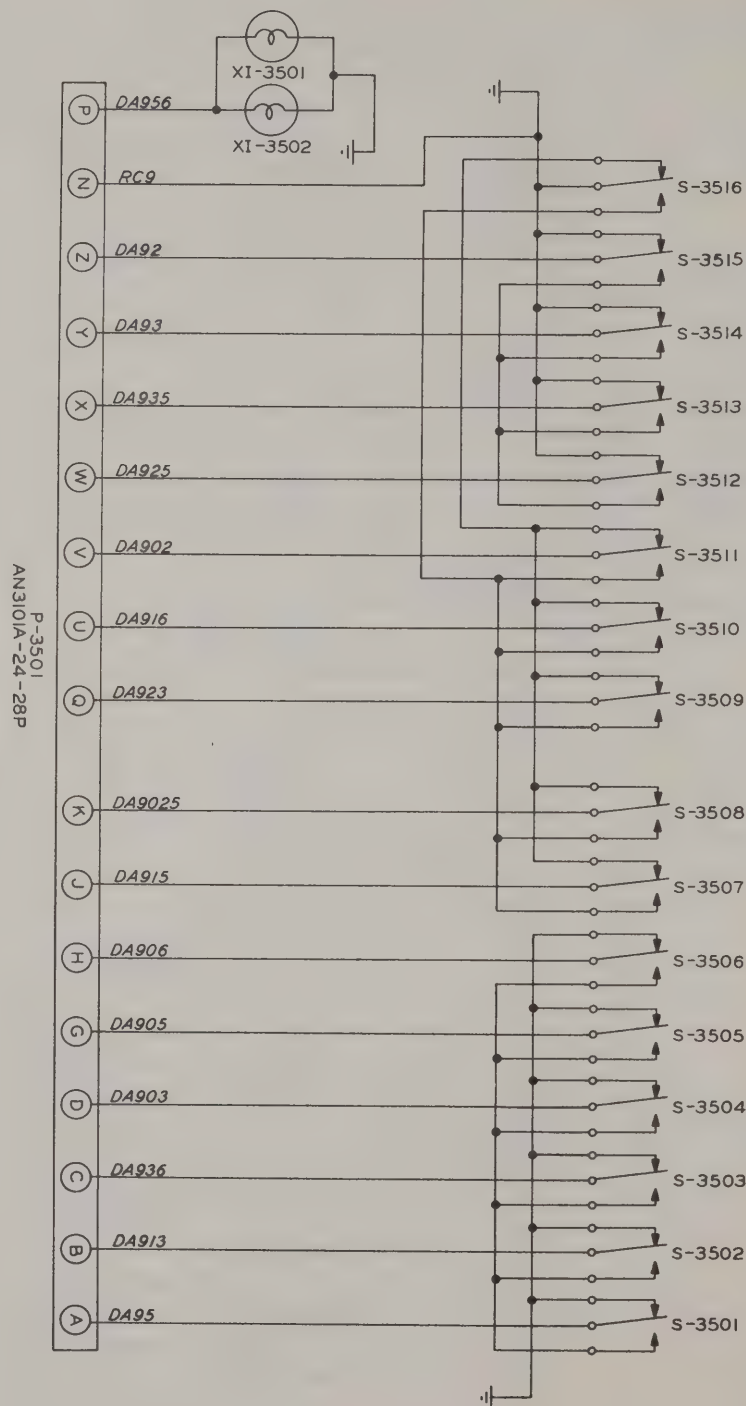


Figure 6-14L. Radio Set Control C-1025/ARC-27A, Schematic

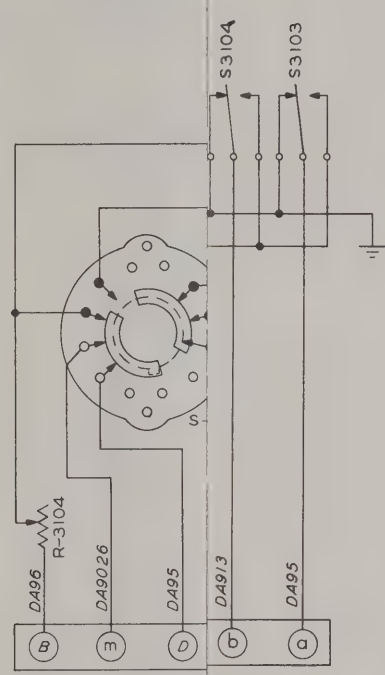


Figure 6-14J. Radio Set C

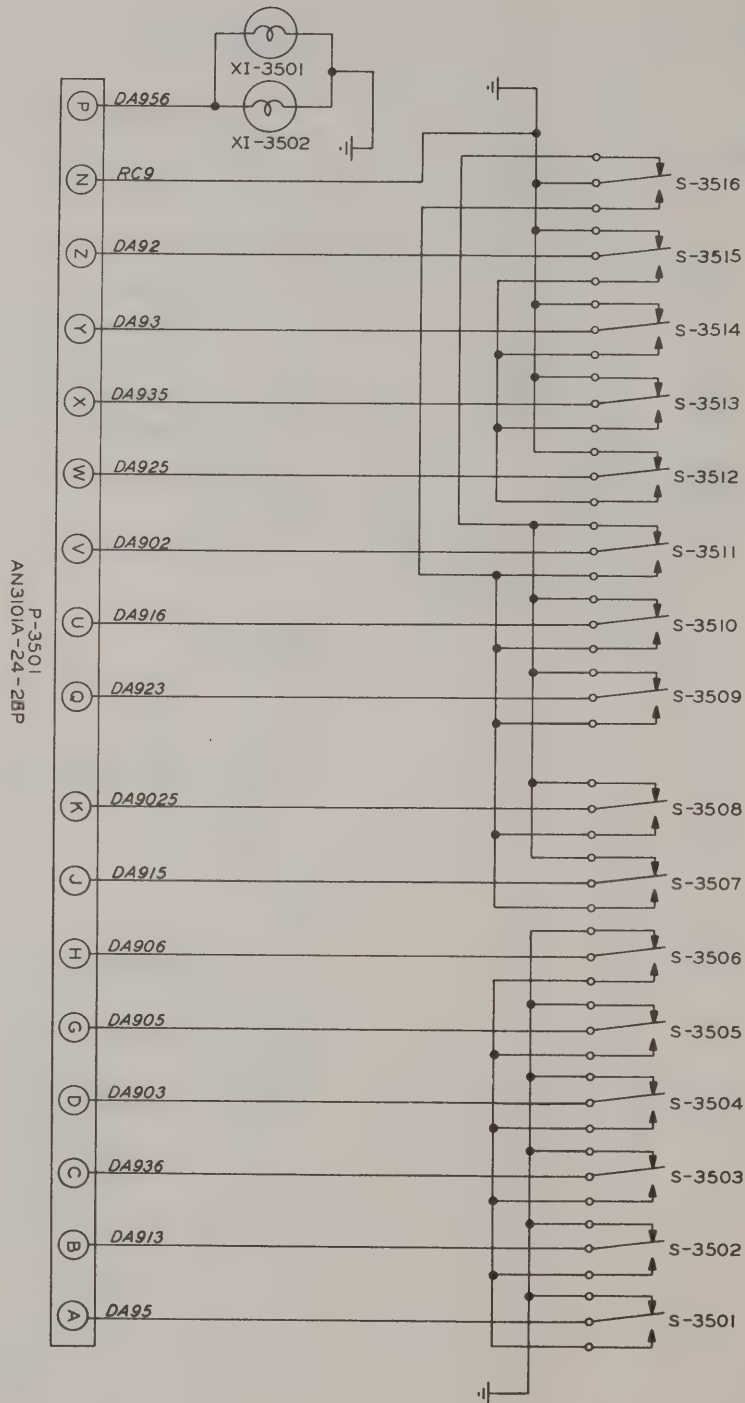


Figure 6-14L. Radio Set Control C-1025/ARC-27A, Schematic

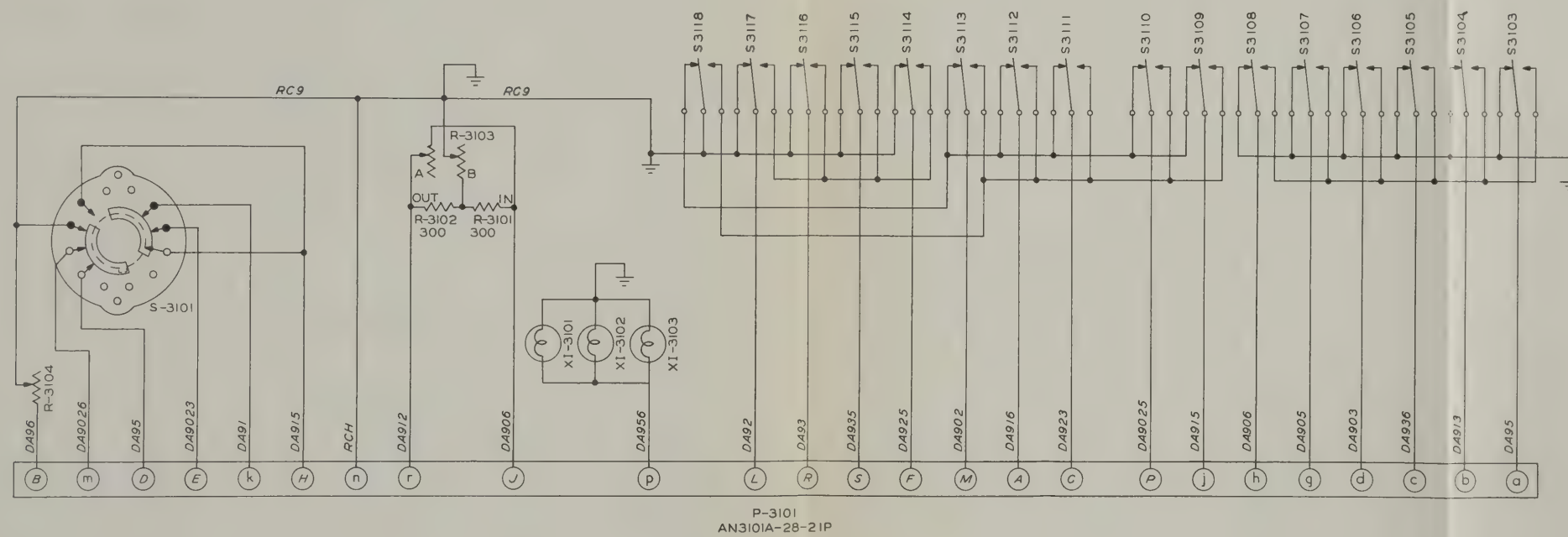


Figure 6-14J. Radio Set Control C-1015/ARC-27A, Schematic

RESTRICTED

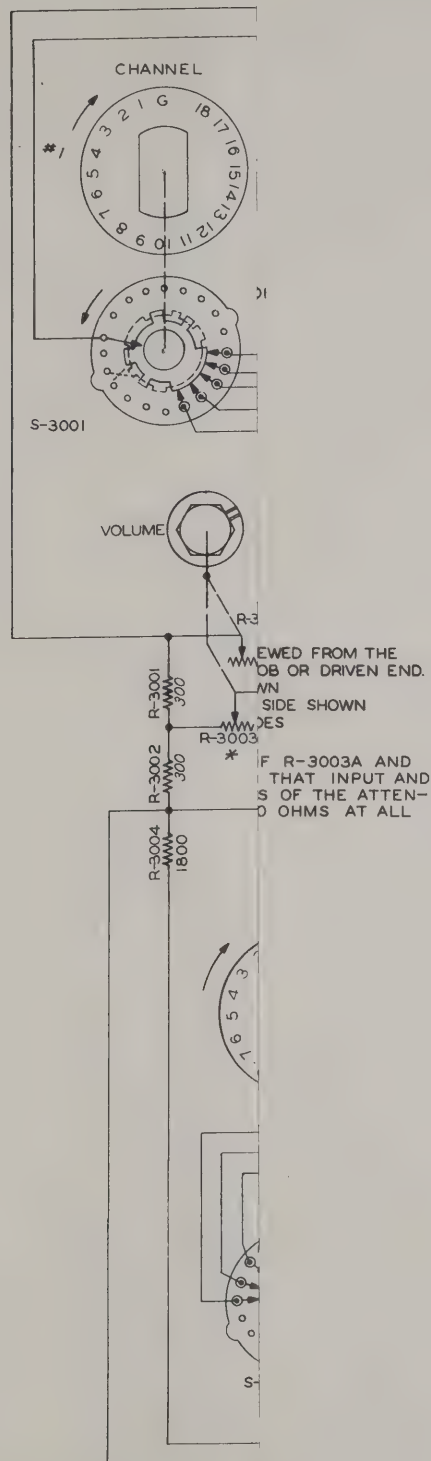


Figure 6-14I. Radio S

RE

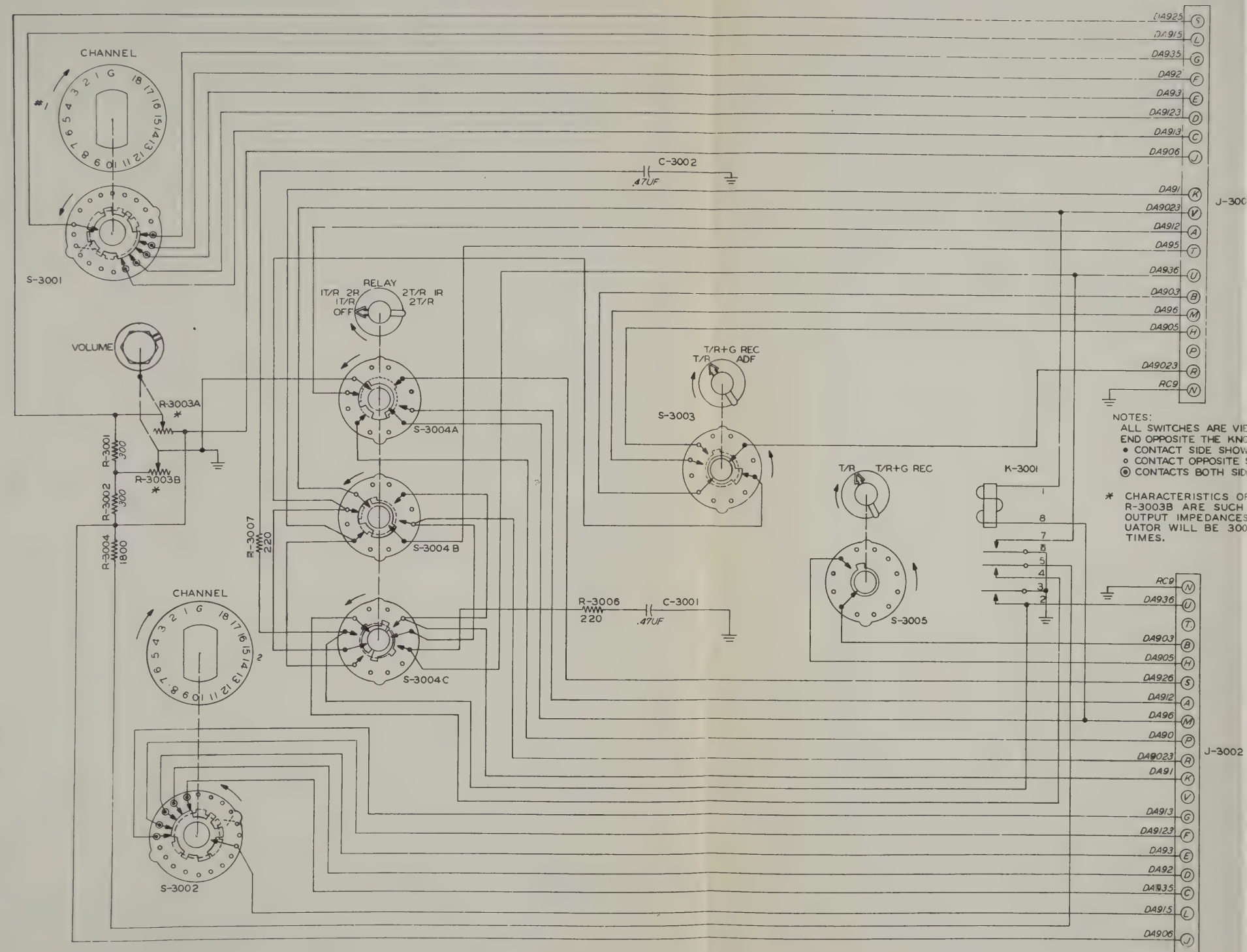


Figure 6-14L. Radio Set Control C-914/ARC-27, Schematic

RESTRICTED

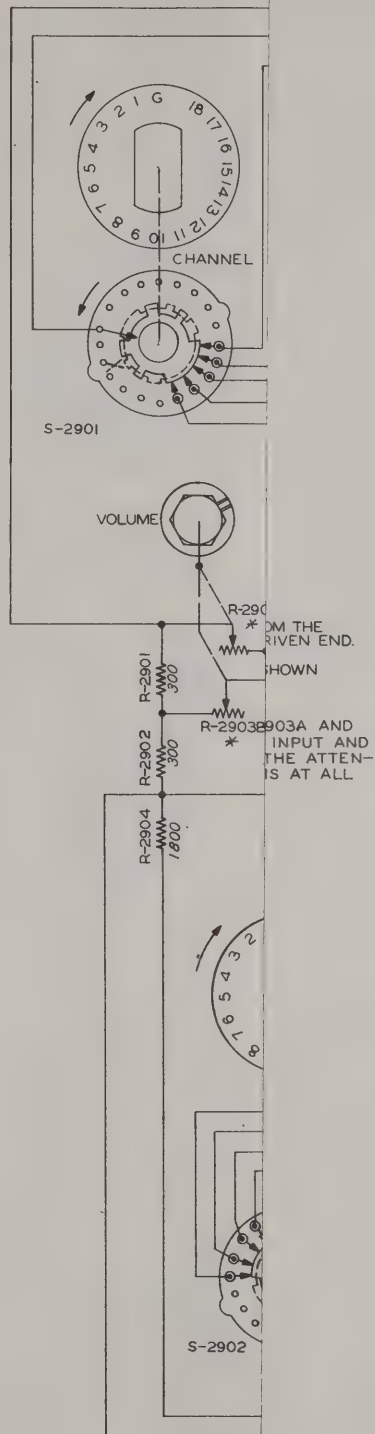


Figure 6-14H. Radio Set

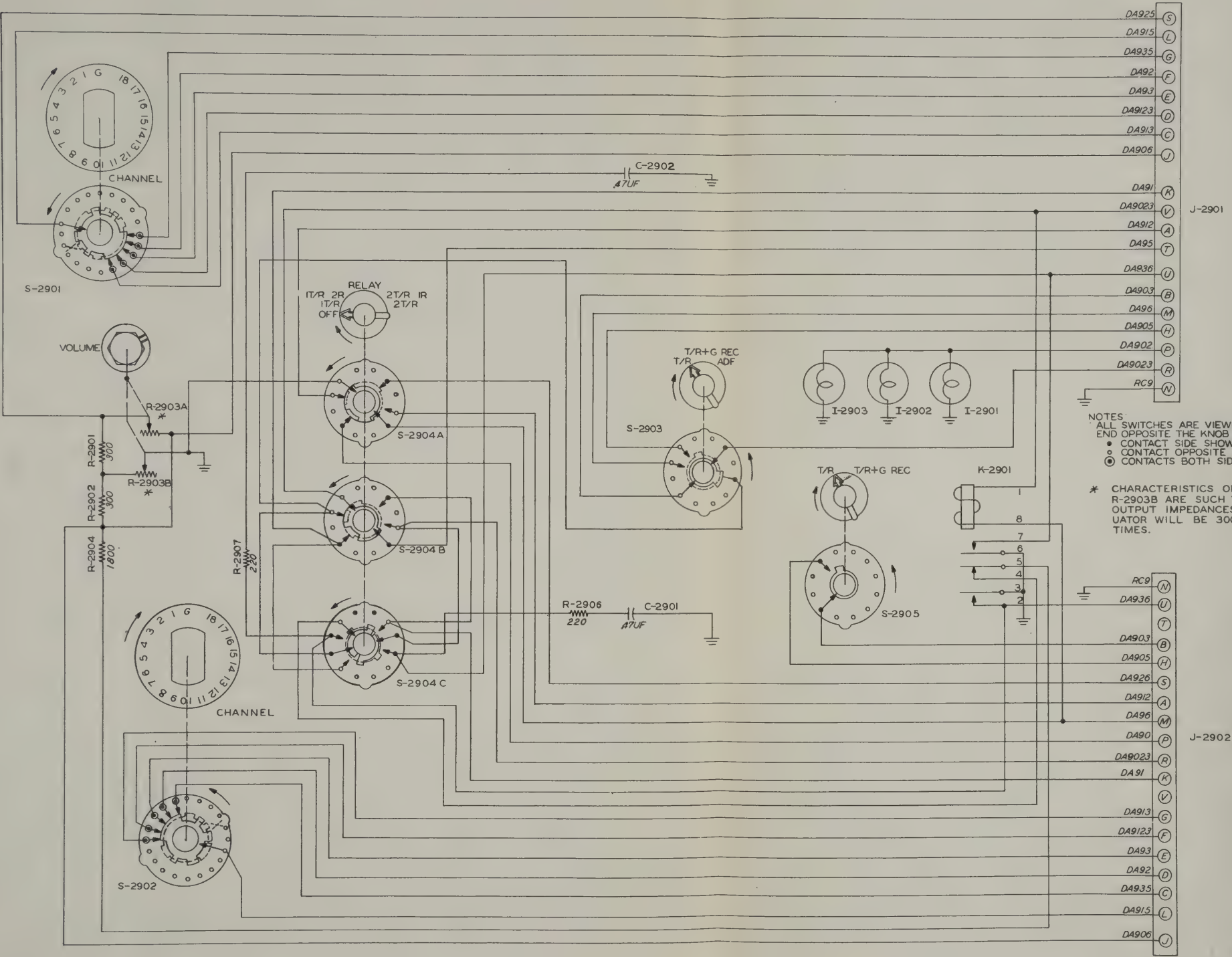


Figure 6-14H. Radio Set Control C-913/ARC-27, Schematic

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87H/88H

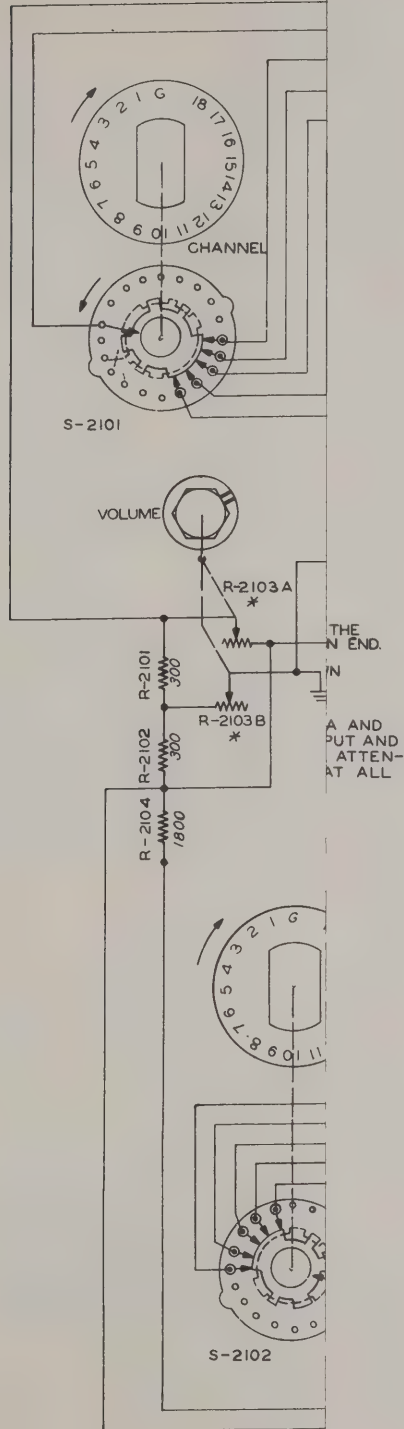


Figure 6-14G. Radio Set

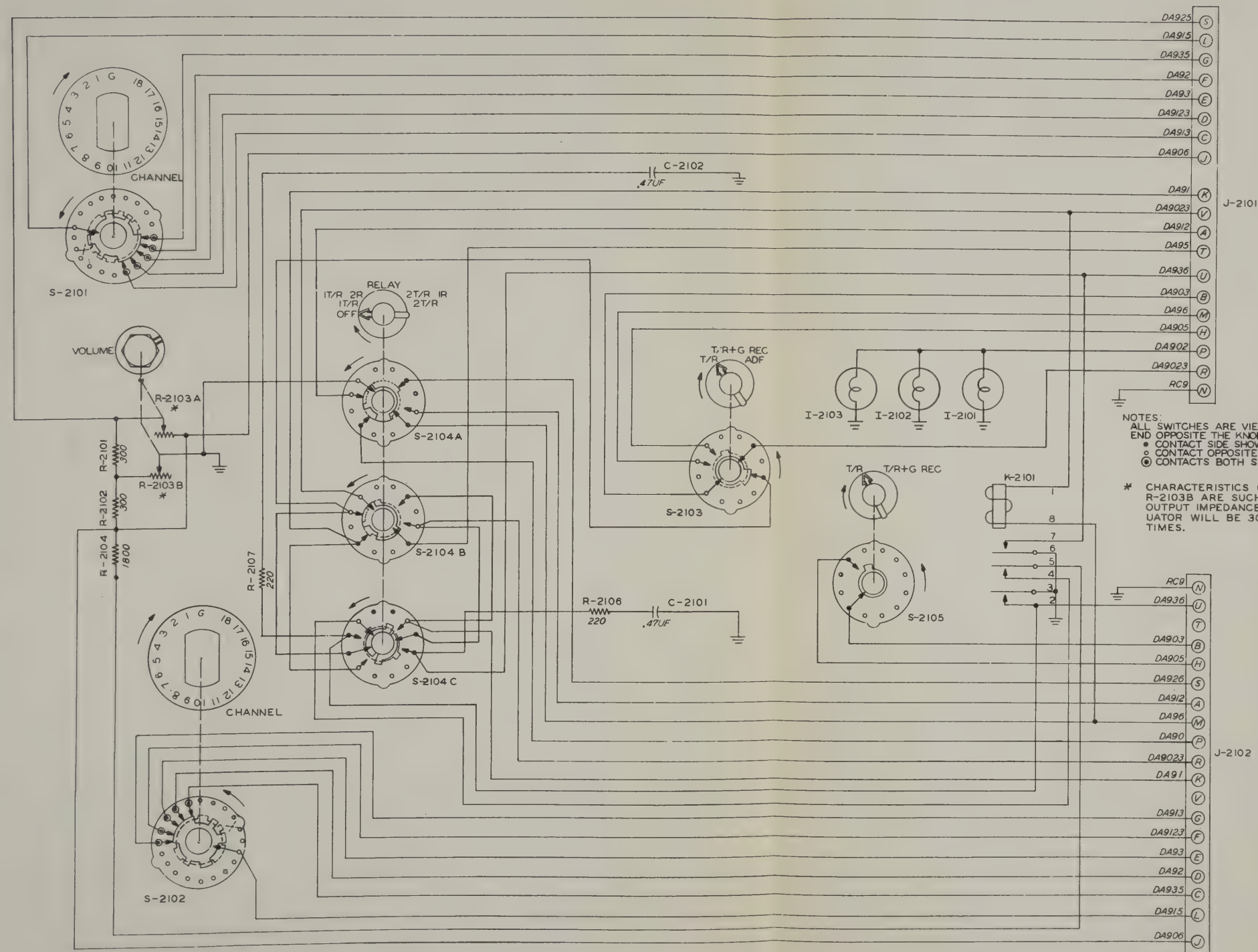
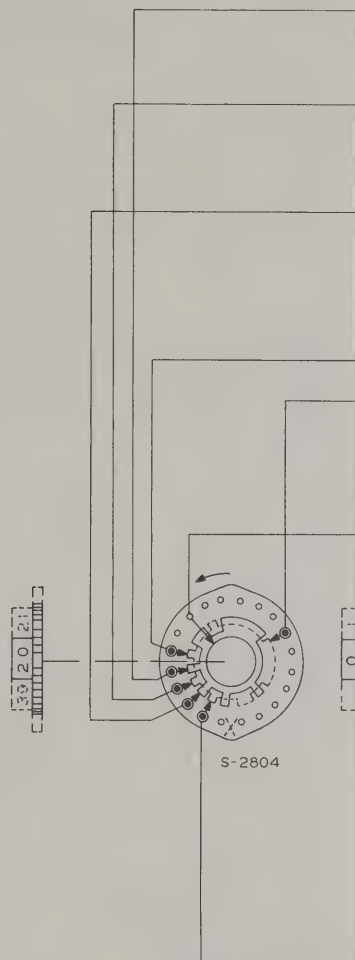


Figure 6-14G. Radio Set Control C-853/ARC-27, Schematic

RESTRICTED



NOTES.
ALL SWITCHES ARE SHOWN AS VIEW
SIDE OPPOSITE DIAL OR KNOB END
• CONTACT SIDE SHOWN
○ CONTACT OPPOSITE SIDE
● BOTH SIDES
ROTOR BLADES ON OPPOSITE SIDE
ARE SHOWN WITH BROKEN LINES.

Figure 6-14F. Radio Se



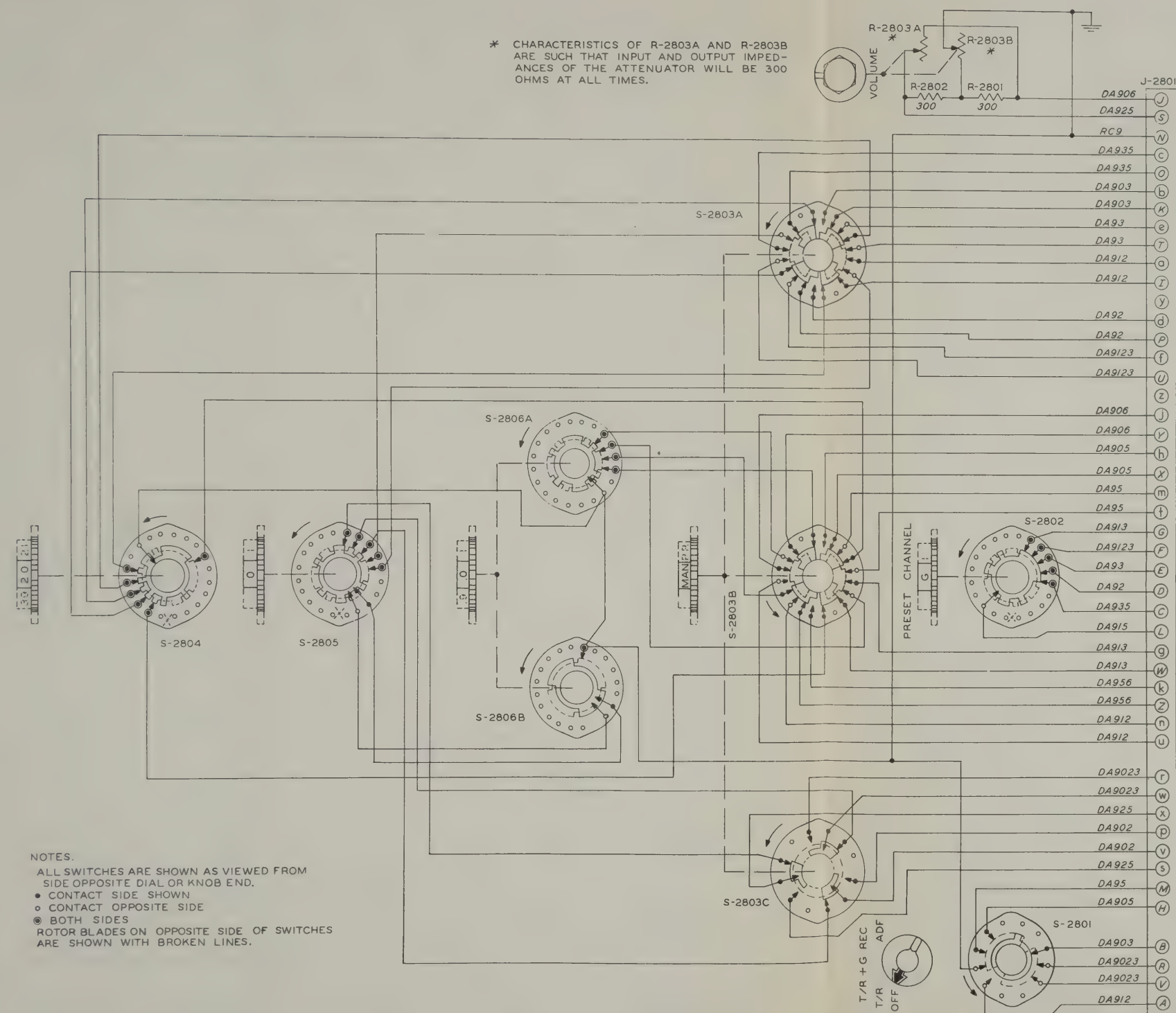


Figure 6-14F. Radio Set Control C-912/ARC-27, Schematic

RESTRICTED



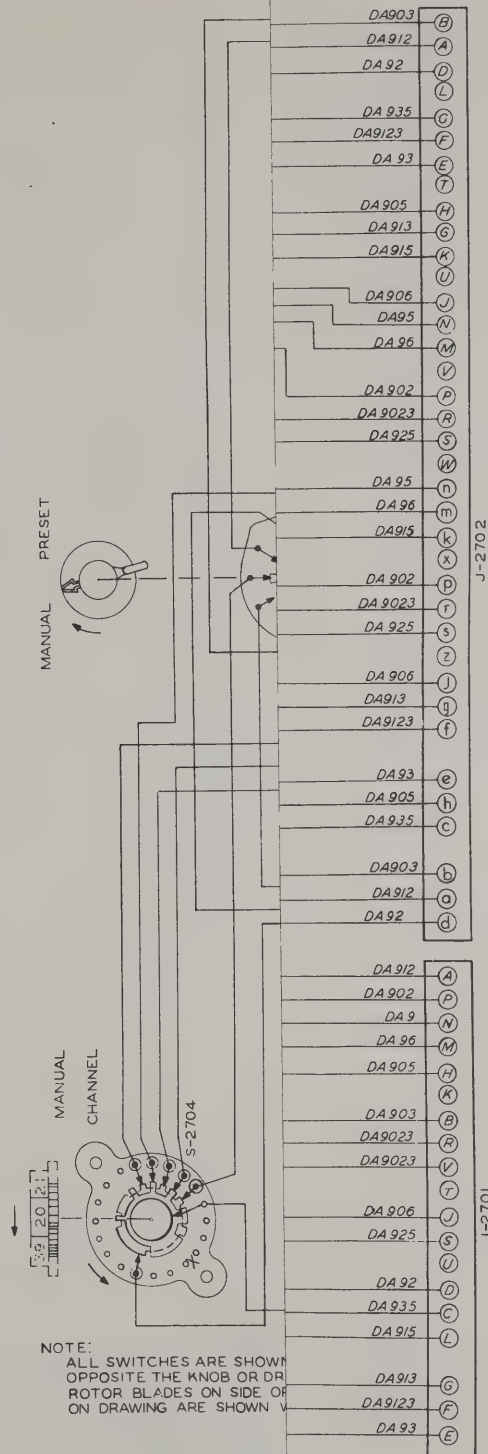


Figure 6-14E. Radio Set C

RES



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3



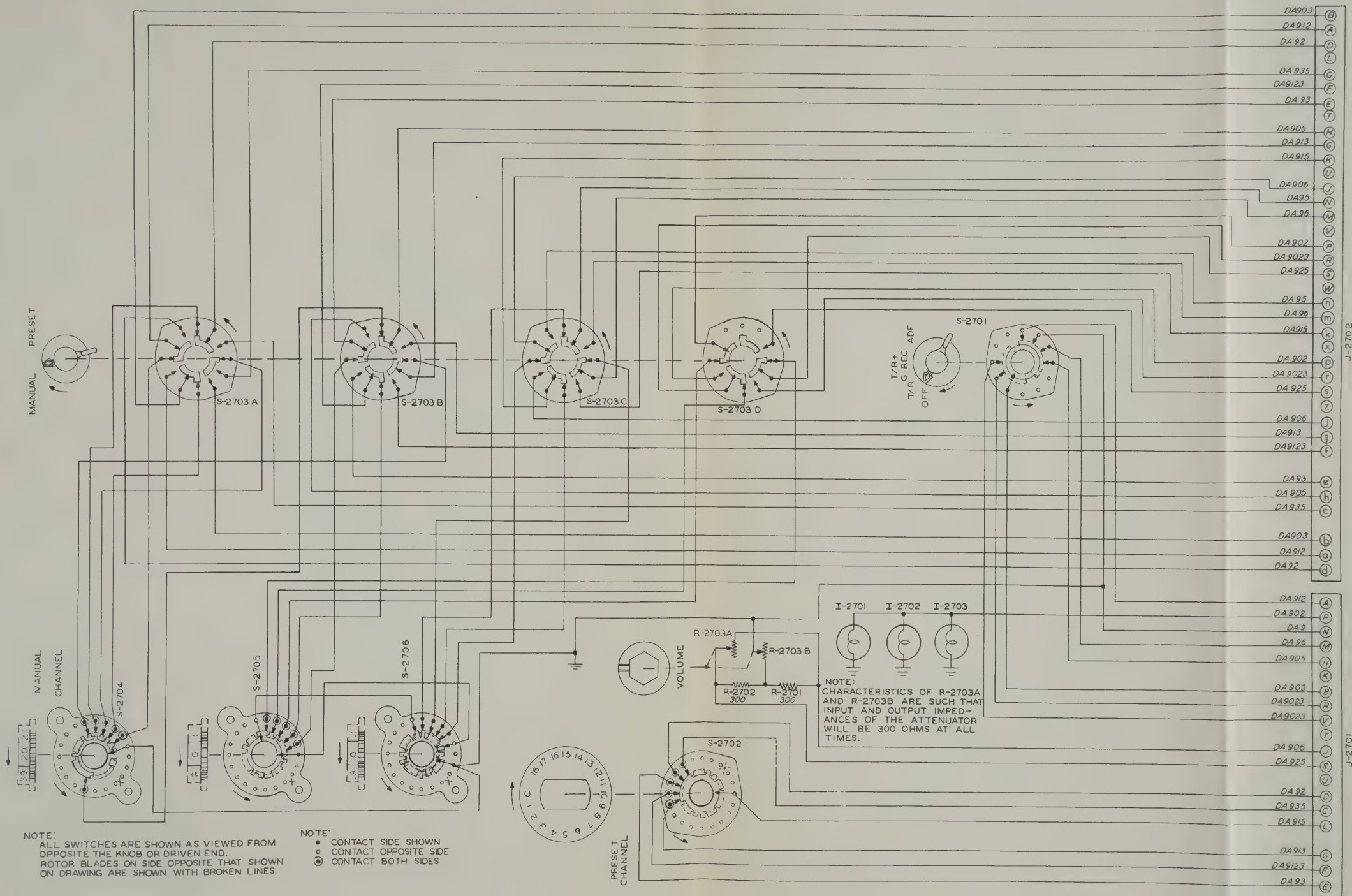


Figure 6-14E. Radio Set Control C-906/ARC-27, Schematic

RESTRICTED



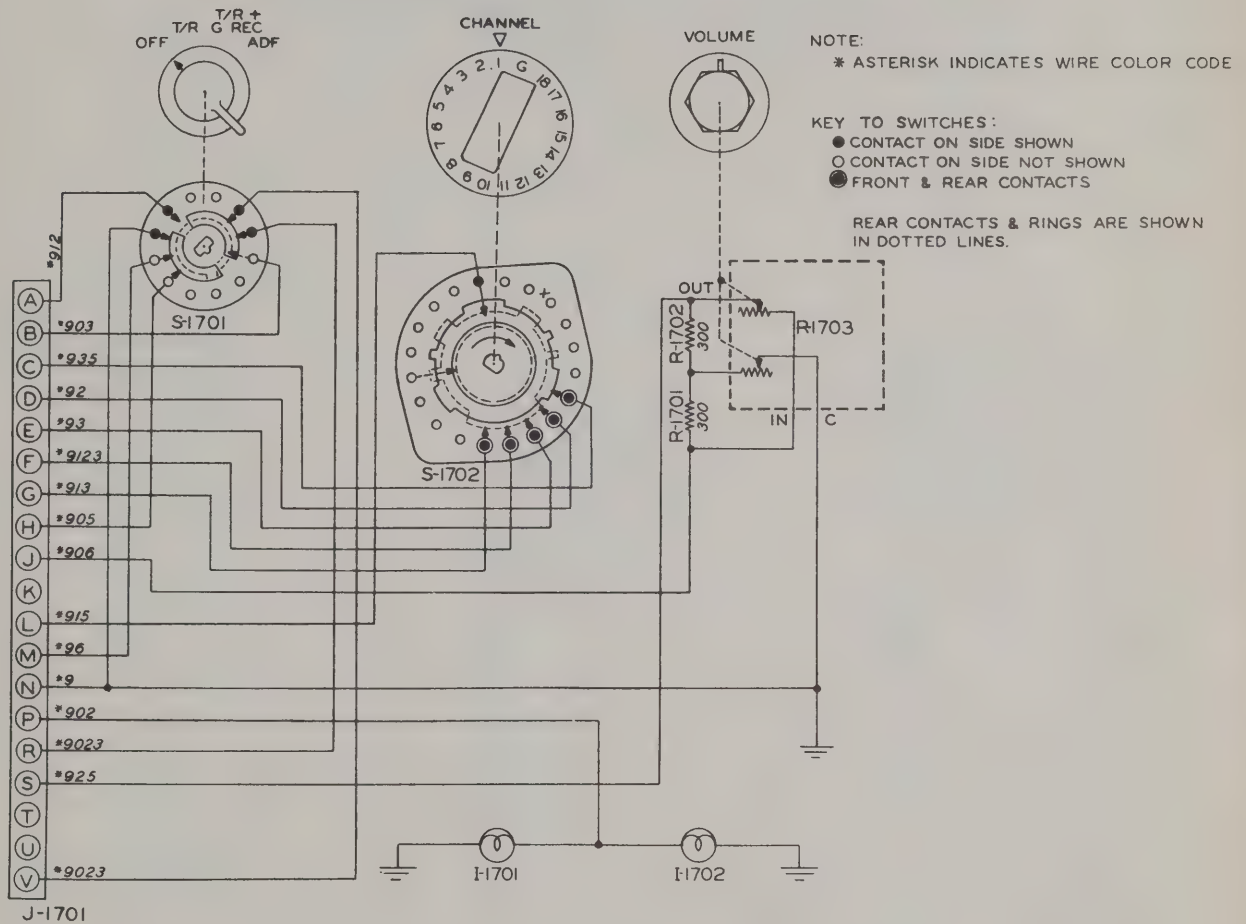


Figure 6-14. Radio Set Control C-628/ARC-27, Schematic

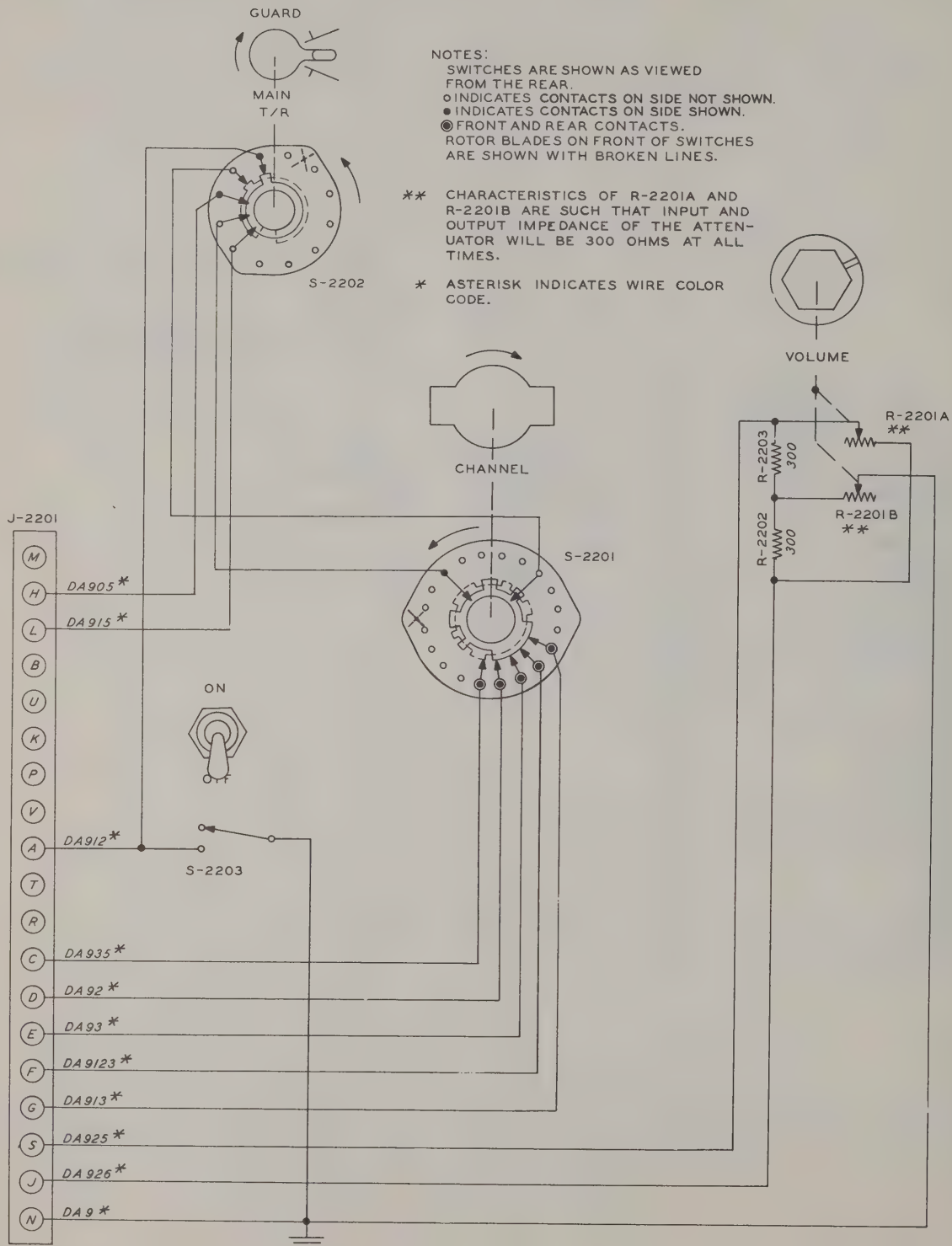


Figure 6-14A. Radio Set Control C-627/ARC-27, Schematic

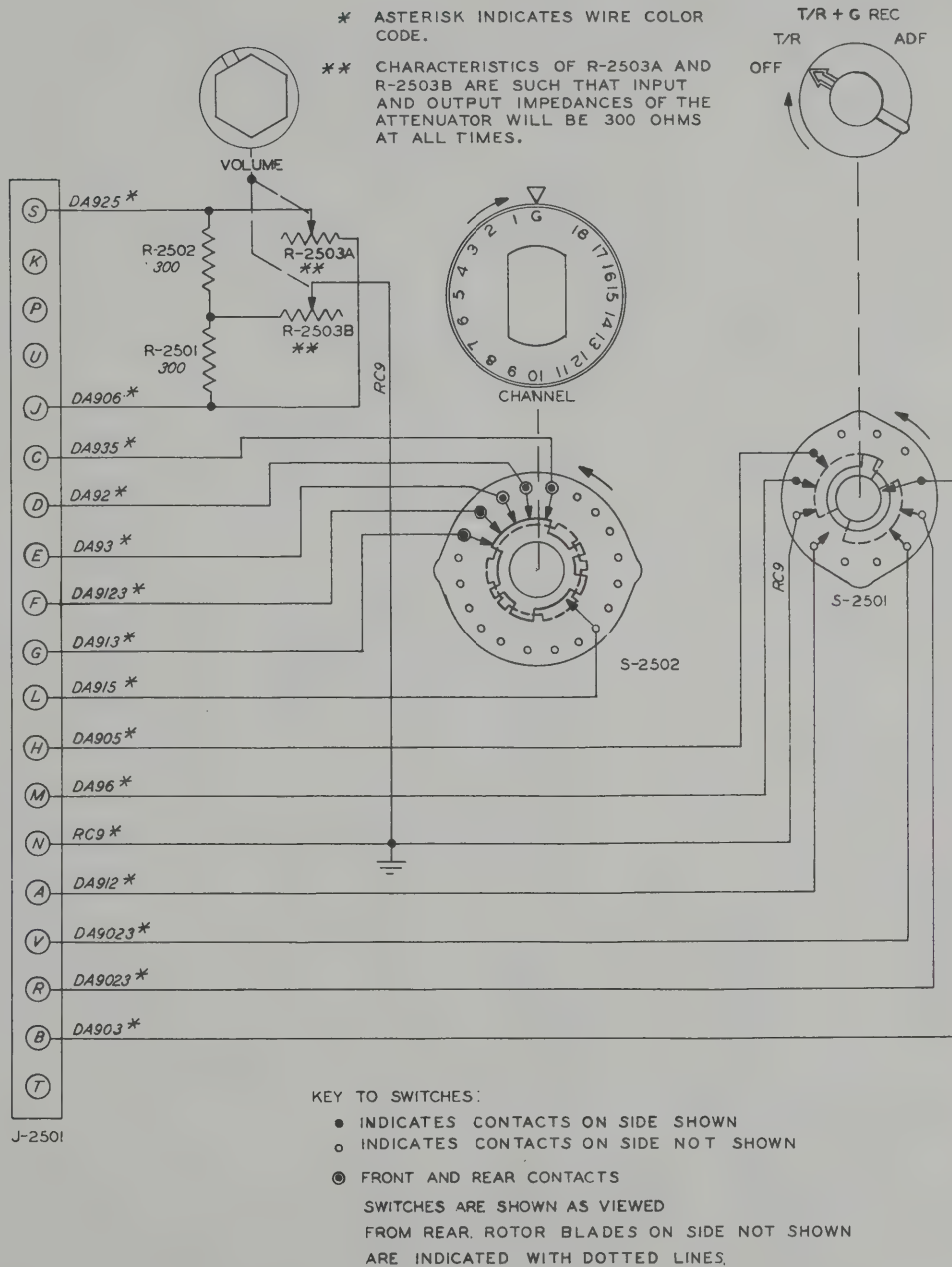
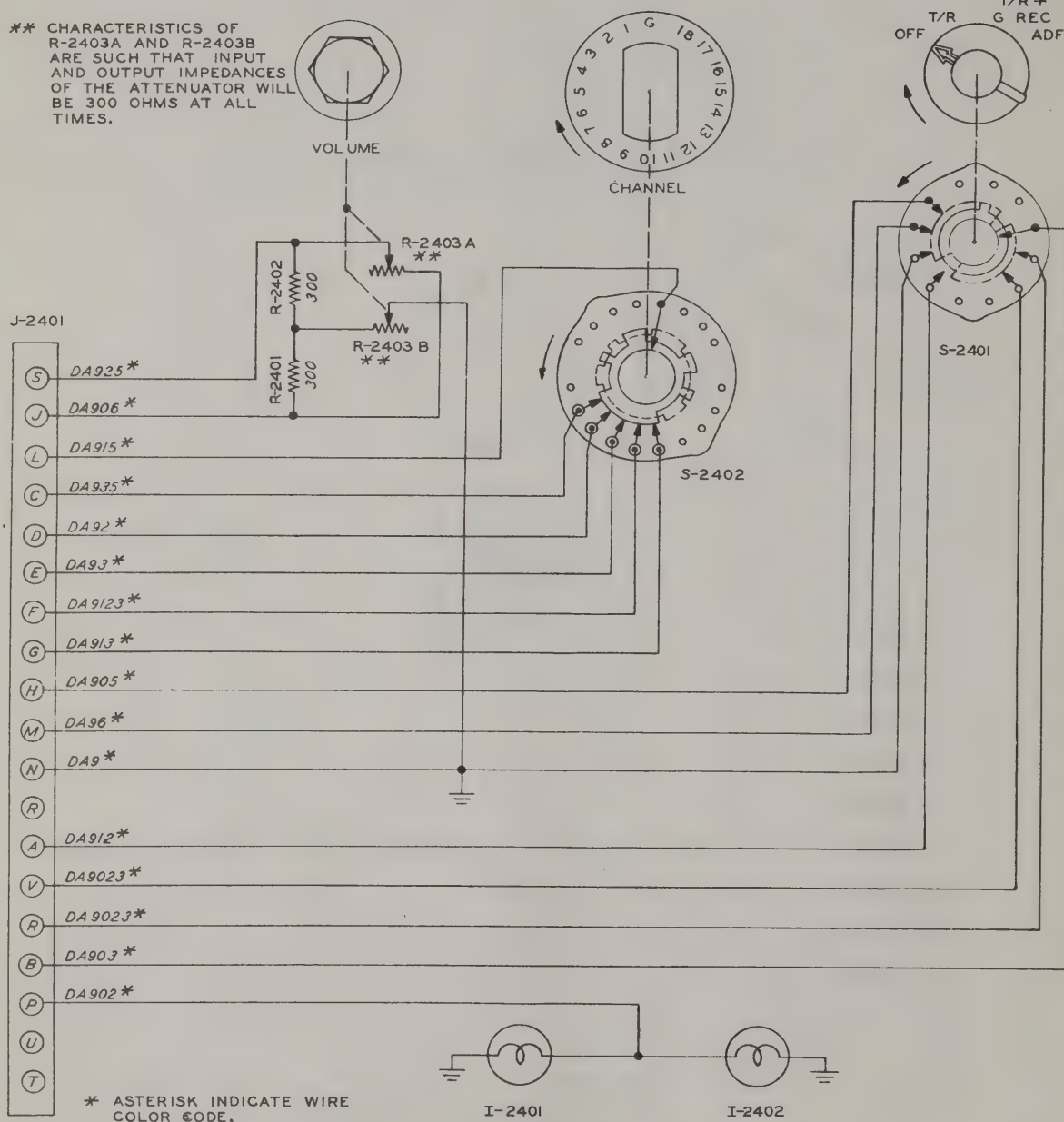


Figure 6-14B. Radio Set Control C-911/ARC-27, Schematic

** CHARACTERISTICS OF R-2403A AND R-2403B ARE SUCH THAT INPUT AND OUTPUT IMPEDANCES OF THE ATTENUATOR WILL BE 300 OHMS AT ALL TIMES.



NOTES:

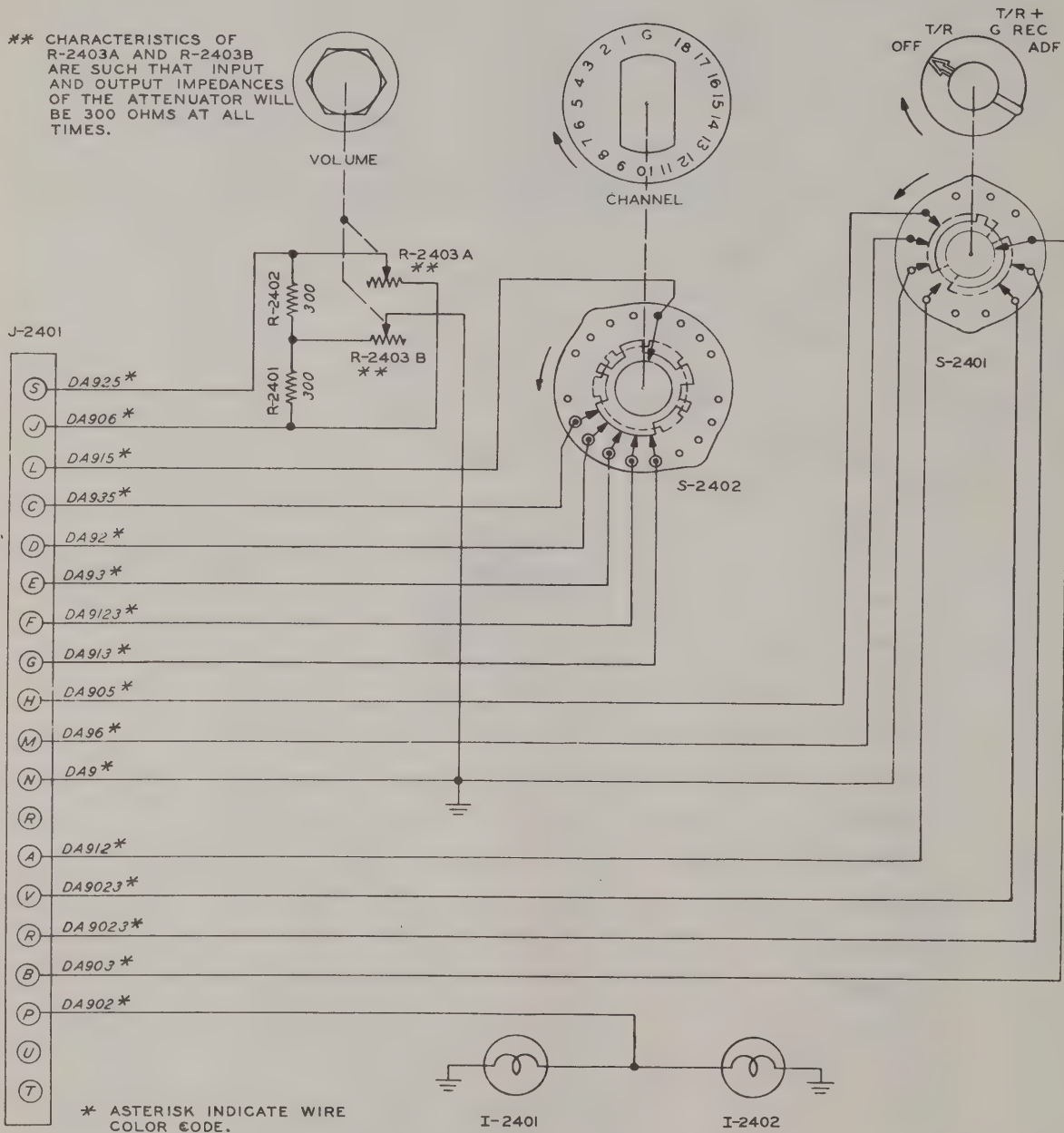
- SWITCHES ARE SHOWN AS VIEWED FROM REAR.
- INDICATES CONTACTS ON SIDE NOT SHOWN.
- INDICATES CONTACTS ON SIDE SHOWN
- ⊙ FRONT AND REAR CONTACTS.
- ROTOR BLADES ON SIDE OF SWITCHES NOT SHOWN ARE INDICATED WITH BROKEN LINES.

Figure 6-14C. Radio Set Control C-868/ARC-27, Schematic



Figure 6-13B. I

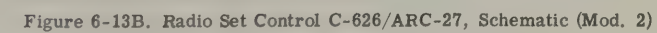
** CHARACTERISTICS OF R-2403A AND R-2403B ARE SUCH THAT INPUT AND OUTPUT IMPEDANCES OF THE ATTENUATOR WILL BE 300 OHMS AT ALL TIMES.



NOTES:

- SWITCHES ARE SHOWN AS VIEWED FROM REAR.
- INDICATES CONTACTS ON SIDE NOT SHOWN.
- INDICATES CONTACTS ON SIDE SHOWN
- ⊙ FRONT AND REAR CONTACTS.
- ROTOR BLADES ON SIDE OF SWITCHES NOT SHOWN ARE INDICATED WITH BROKEN LINES.

Figure 6-14C. Radio Set Control C-868/ARC-27, Schematic



Revised 15 March 1953

85B/86B

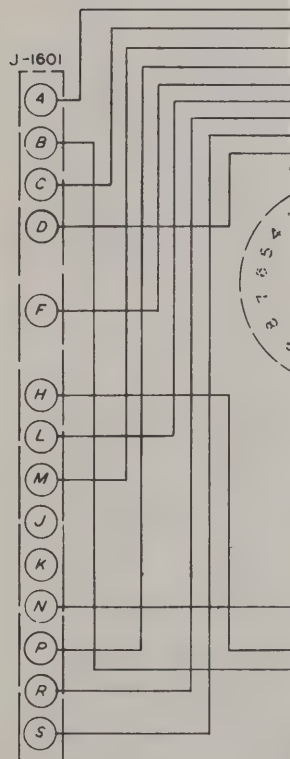
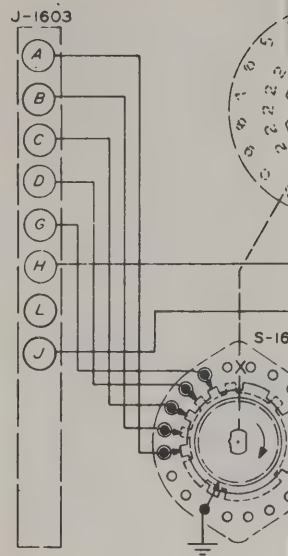
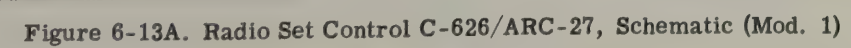


Figure 6-13A. Radio Set Control

REST



Revised 15 March 1953

85A/86A

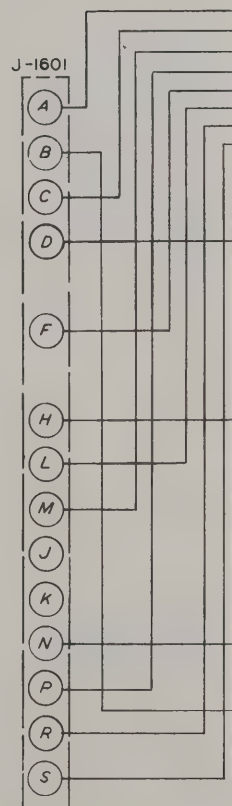
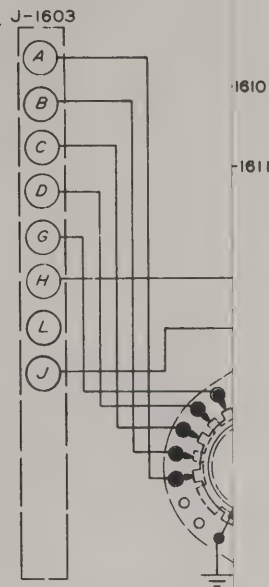


Figure 6-13. Radio Set C

RE

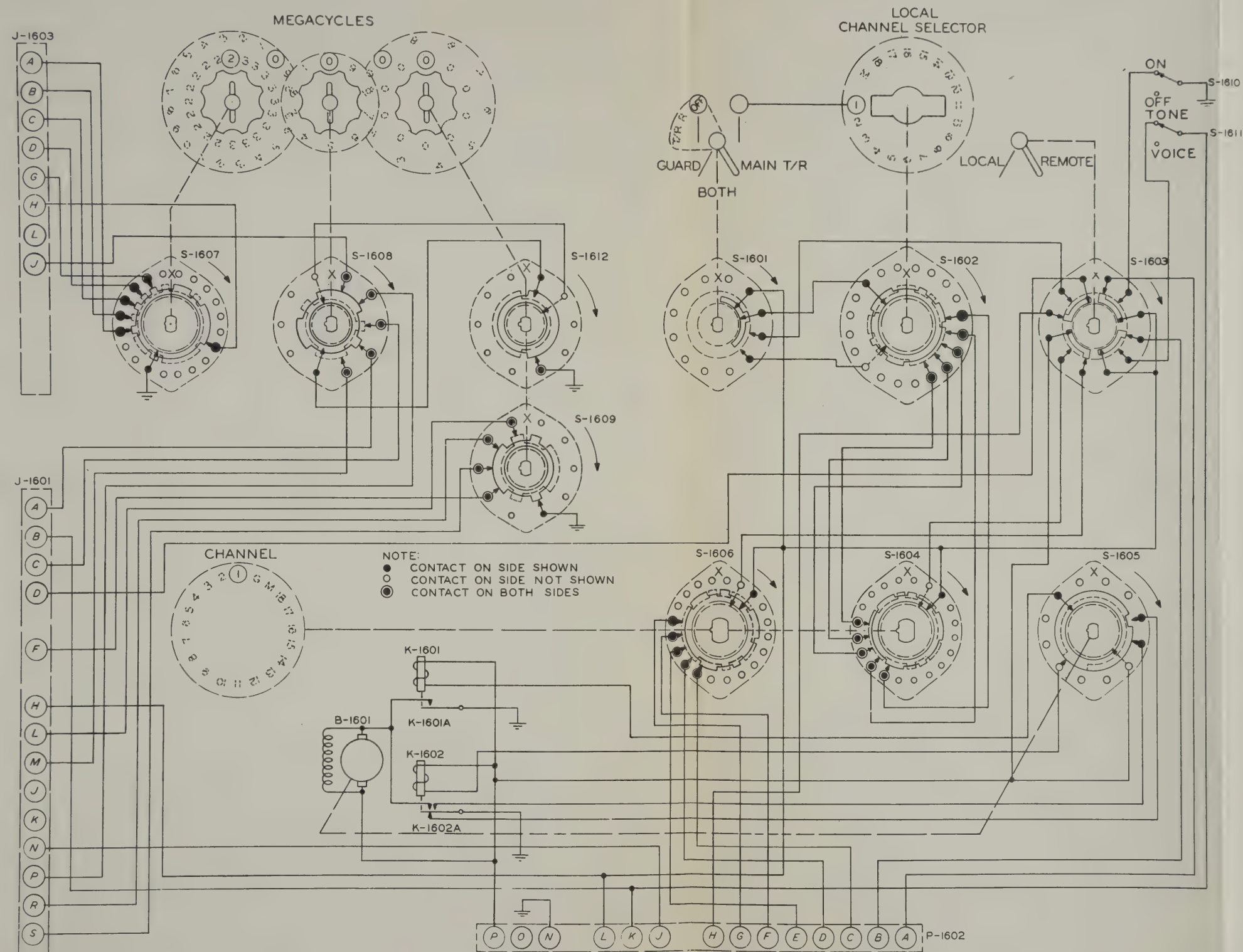
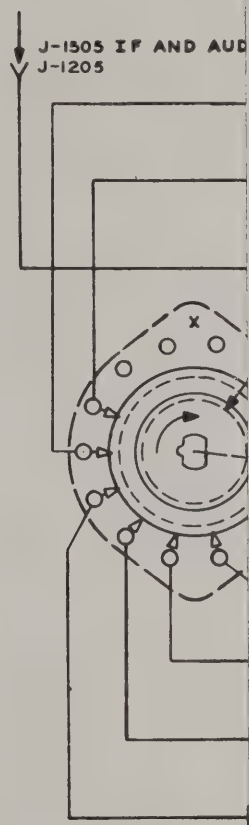


Figure 6-13. Radio Set Control C-626/ARC-27, Schematic

RESTRICTED



* ASTERISK INDIC
COLOR CODE.
** ADDED V-1201,
IN MOD 1 & A

Figure 6-12. Receiver-Transmitter Subassembly, Schematic

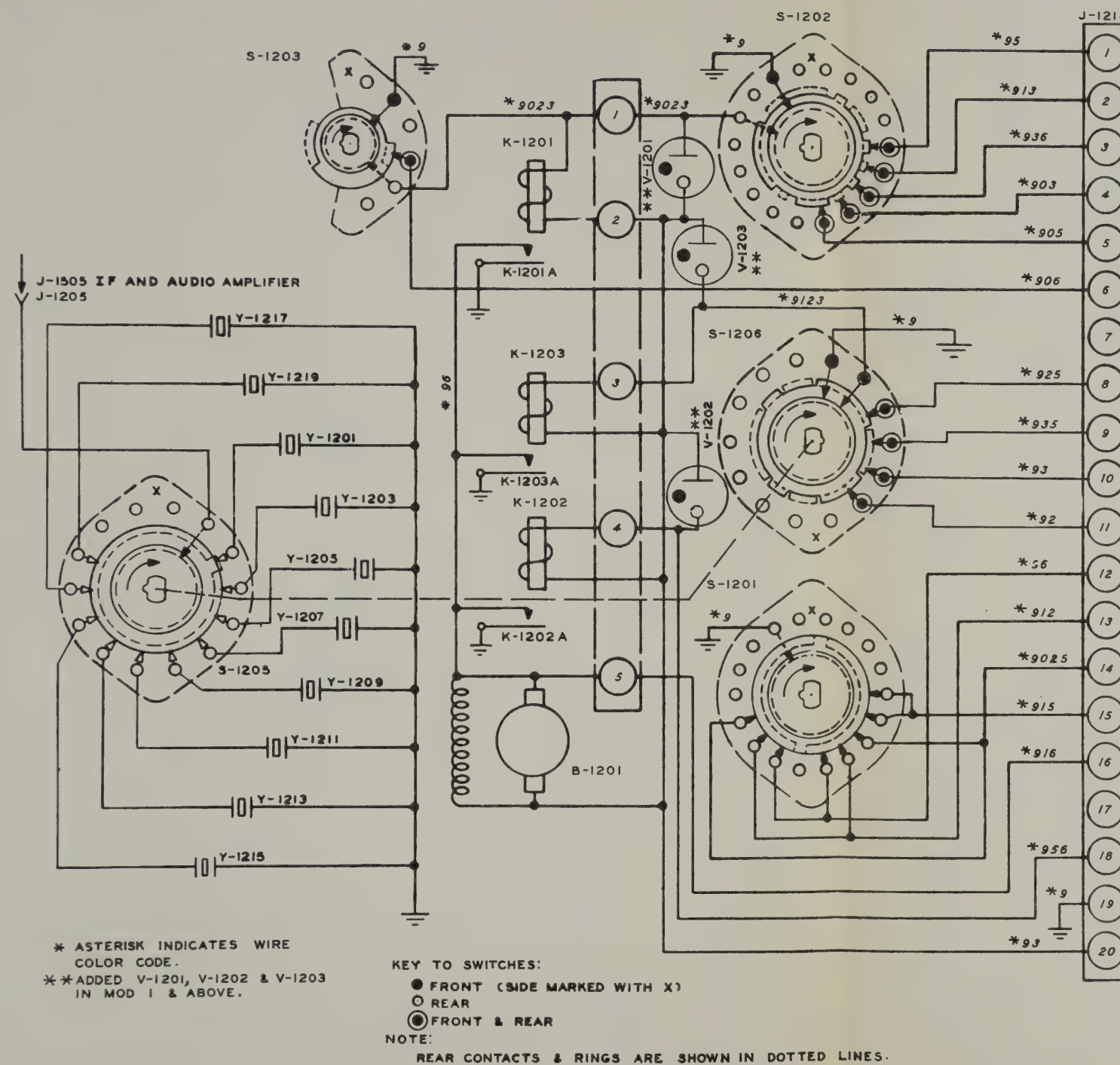


Figure 6-12. Receiver-Transmitter RT-178/ARC-27, Mechanical Tuning Drive Subassembly, Schematic, (Original and Mod. 1)

RESTRICTED

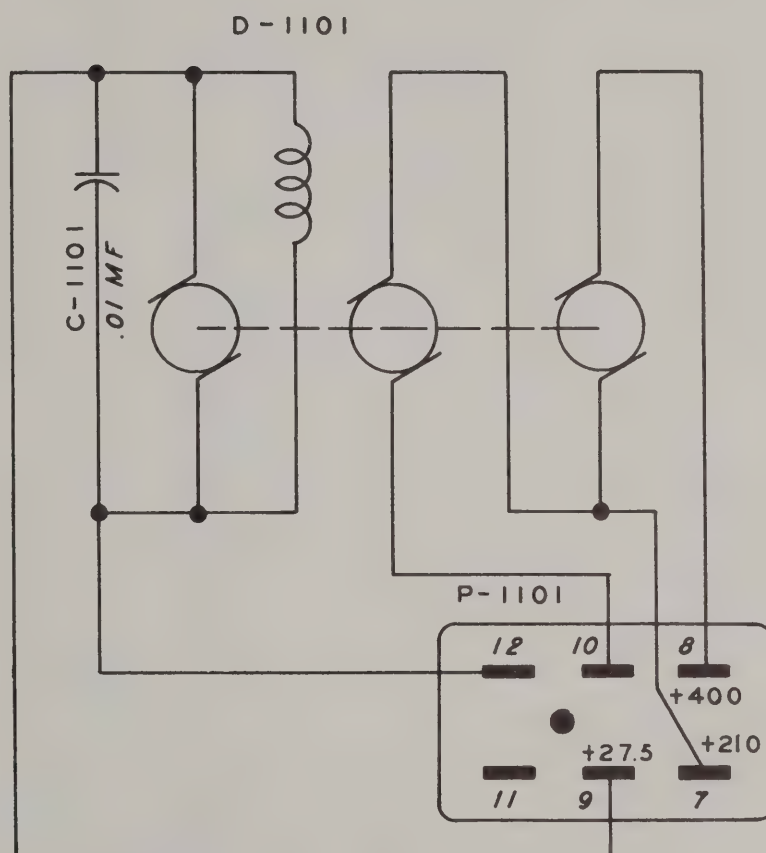


Figure 6-11. Receiver-Transmitter RT-178/ARC-27,
Dynamotor Subassembly, Schematic

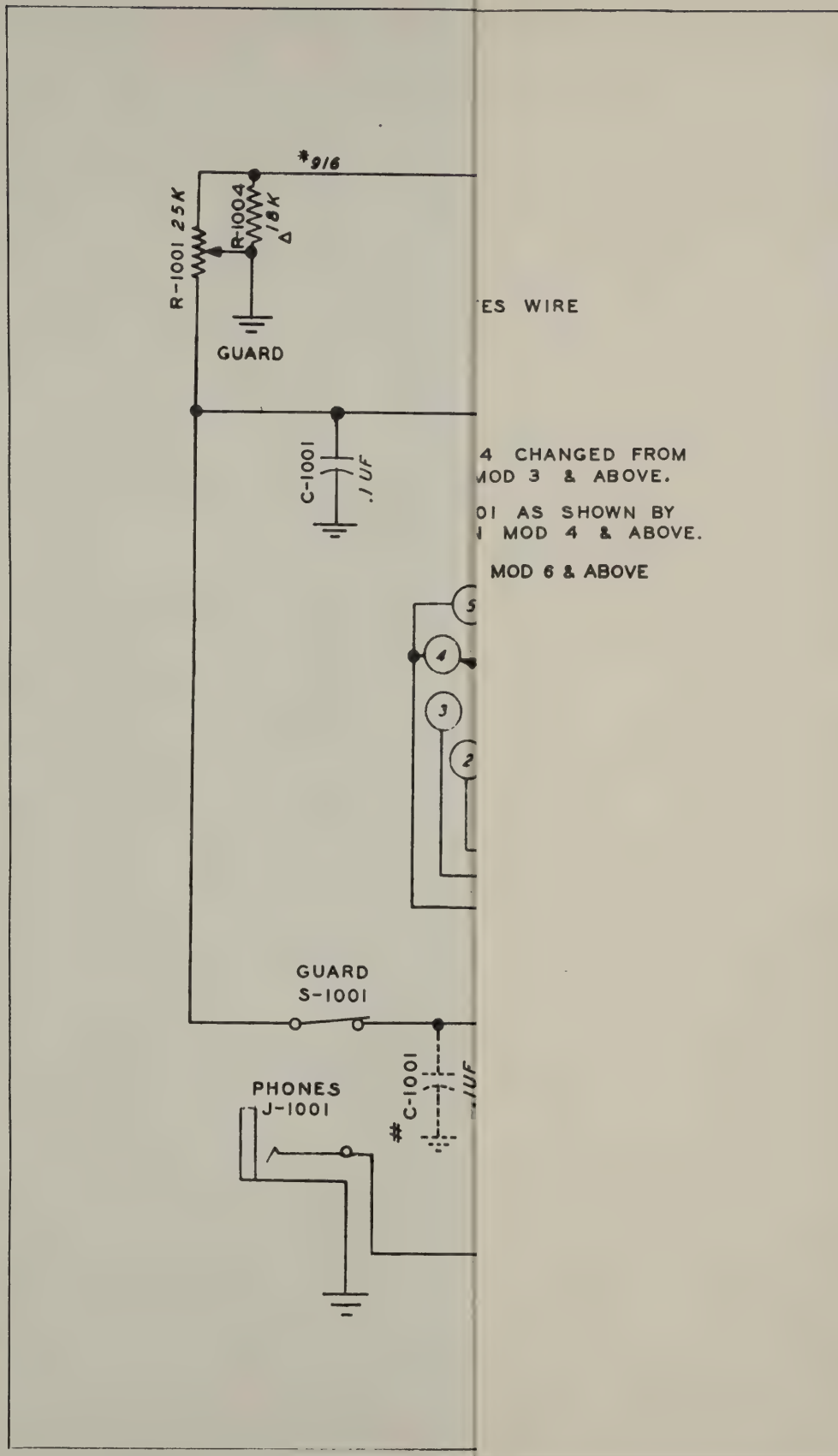
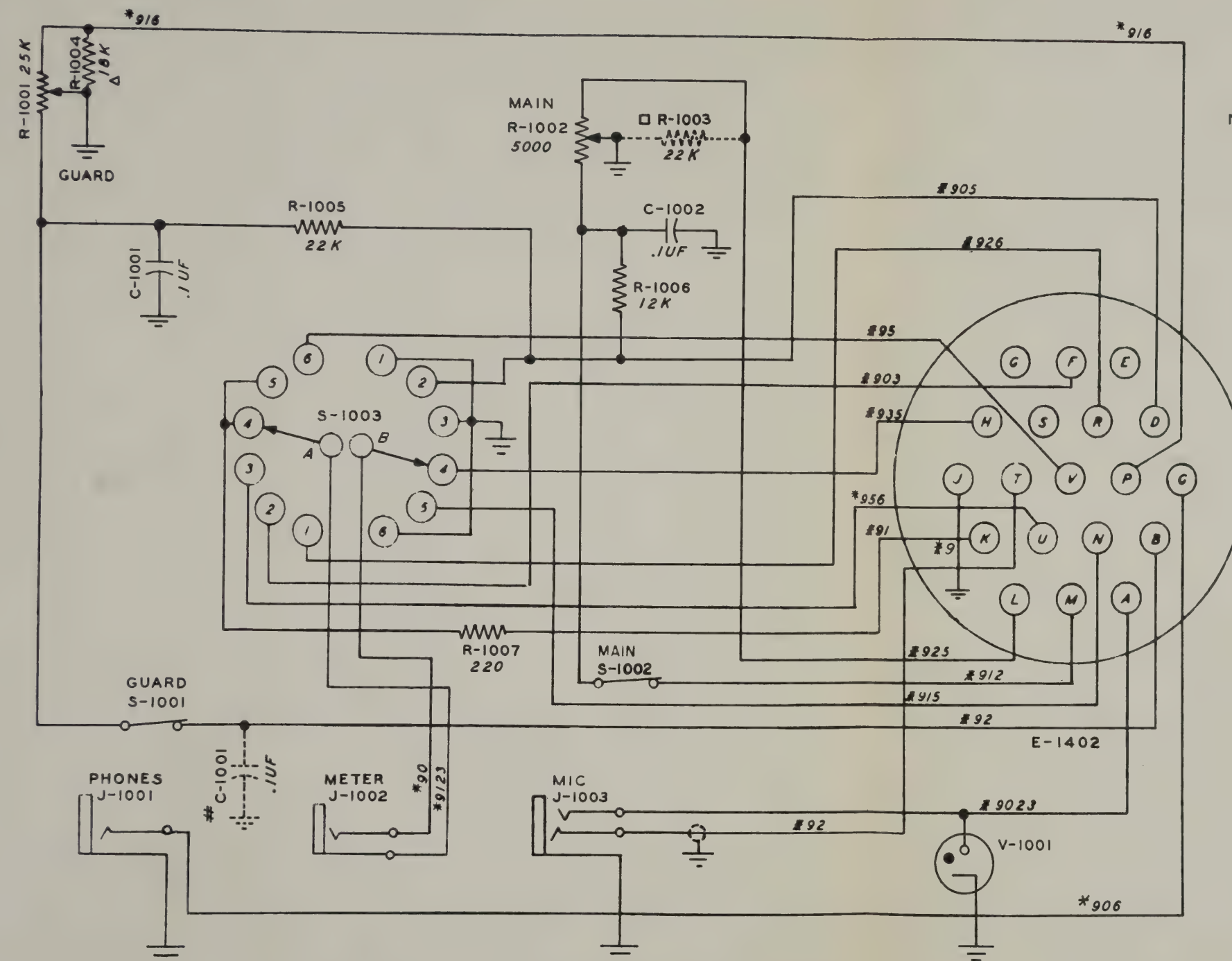


Figure 6-10B. Receiver-Transmitter Schematic,

RE



NOTE:

* ASTERISK INDICATES WIRE
COLOR COLOR.

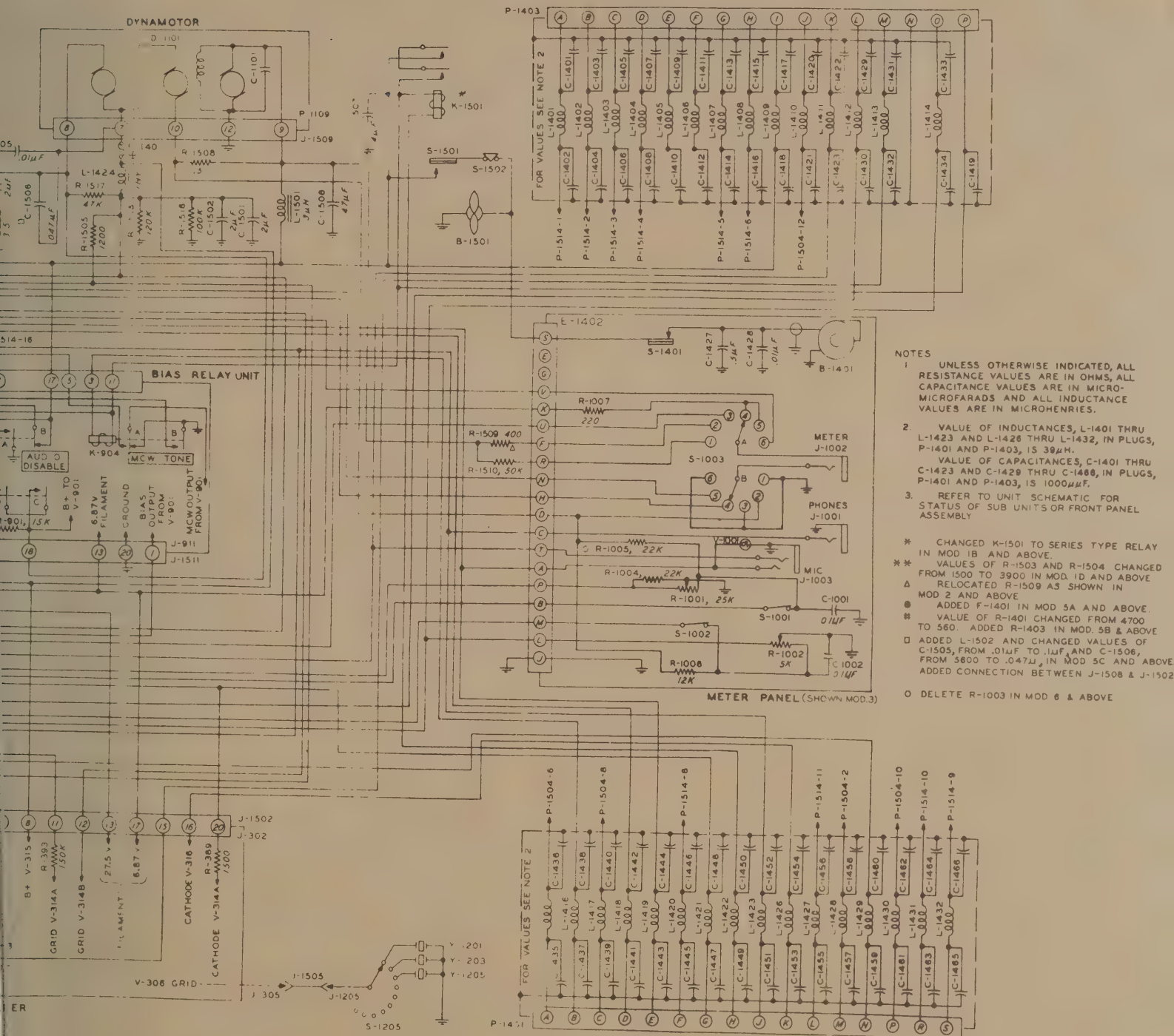
Δ VALUE OF R-1004 CHANGED FROM
18K TO 22K IN MOD 3 & ABOVE.

RELOCATED C-1001 AS SHOWN BY
BROKEN LINE IN MOD 4 & ABOVE.

□ DELETE R-1003 IN MOD 6 & ABOVE

Figure 6-10B. Receiver-Transmitter RT-178/ARC-27, Meter Panel Subassembly,
Schematic, (Mod. 2, 3, 4 and 6)

RESTRICTED



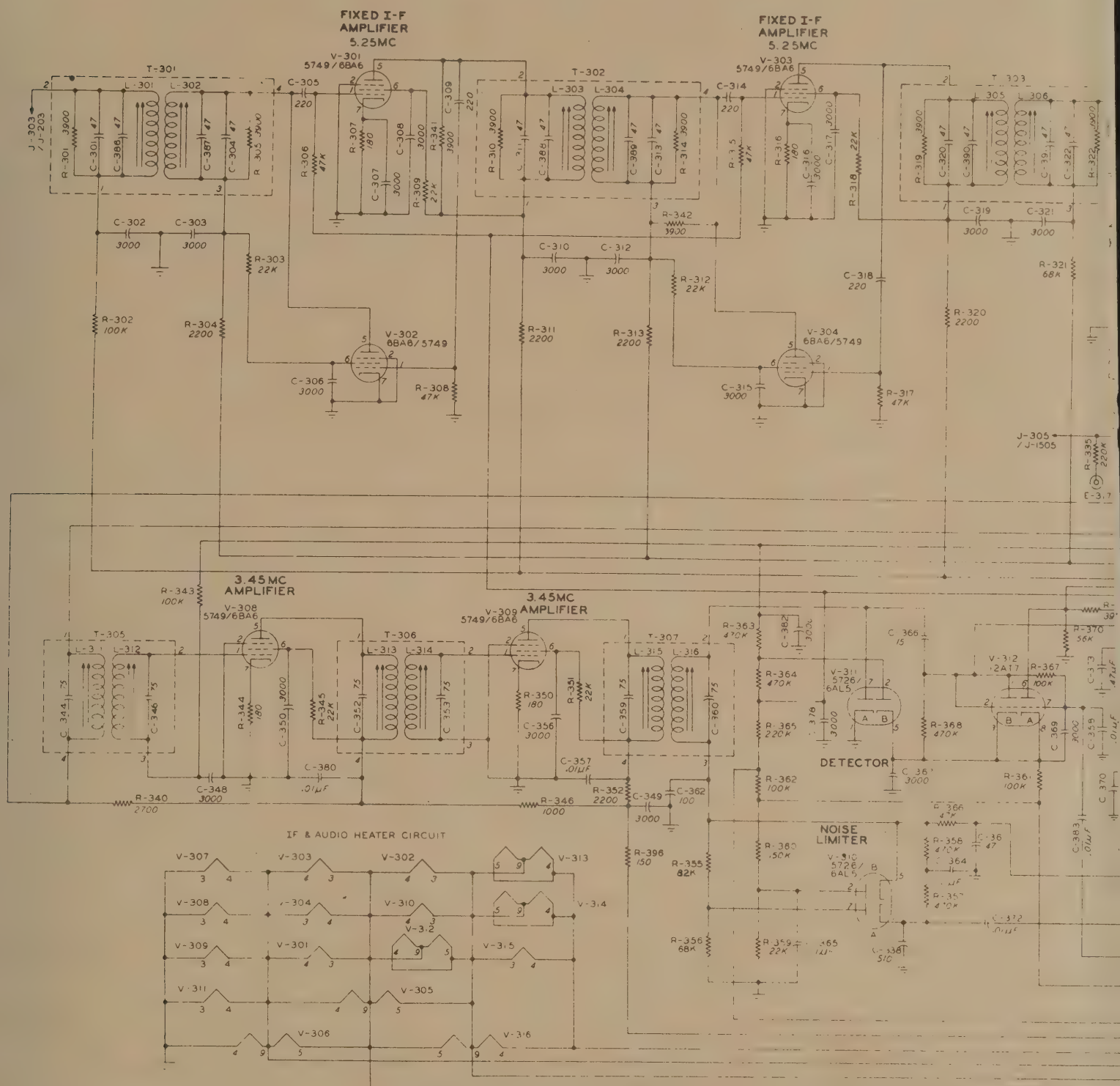


Figure 6-6C. Receiver-Transmitter RT-178/ARC-27, I-F and Audio Amplifier Subassembly, Schematic (Mod. 6)

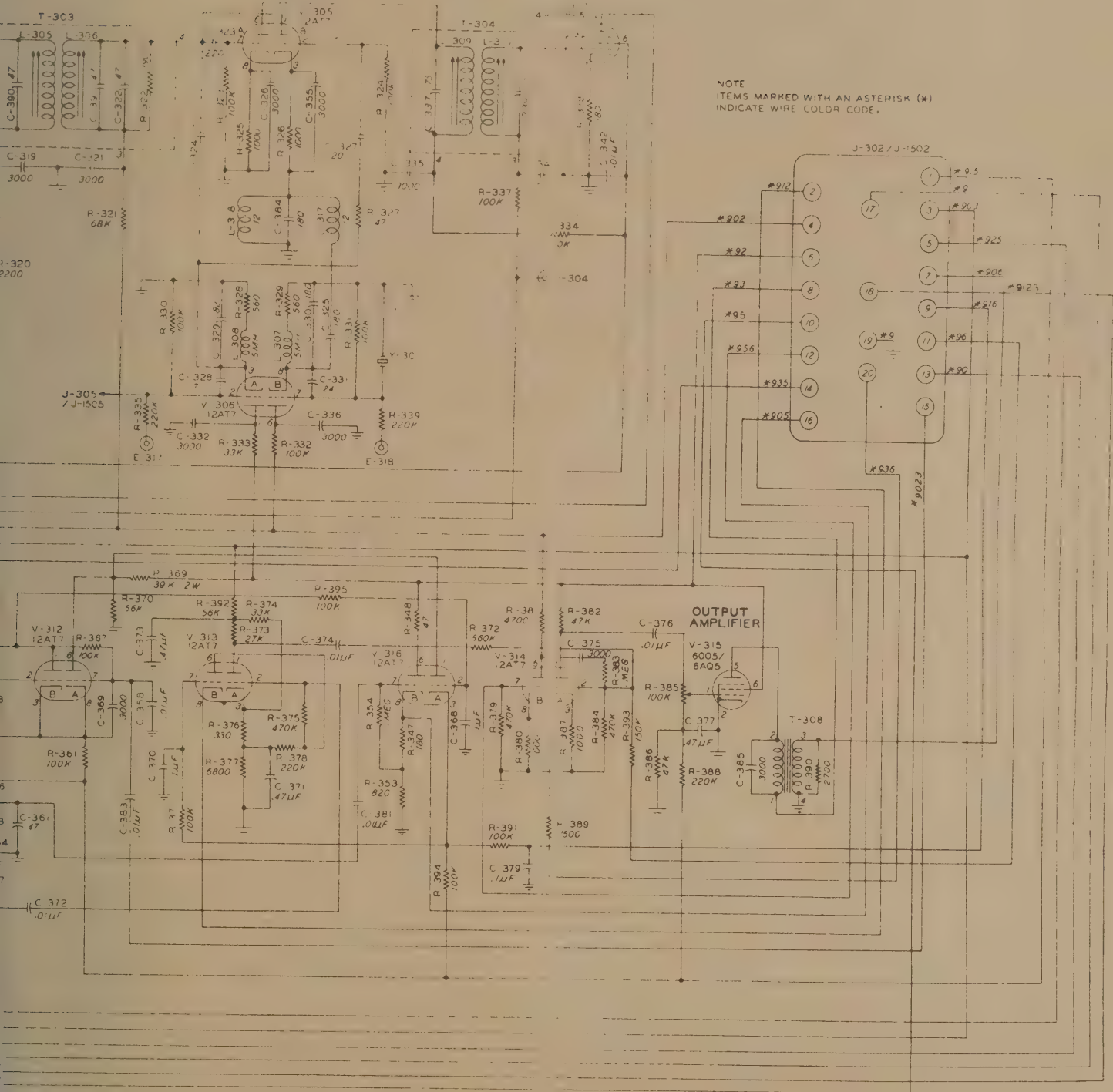
RESTRICTED

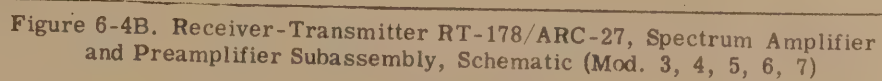
71C/72C

THIRD MIXER

3 45MC AMPLIFIER

NOTE
ITEMS MARKED WITH AN ASTERISK (*)
INDICATE WIRE COLOR CODE.



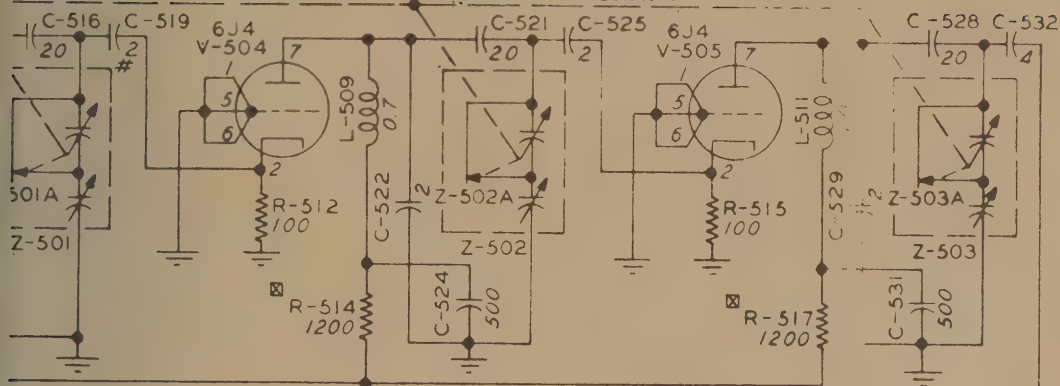


67B/68B

SELECTIVE AMPLIFIER

SELECTIVE AMPLIFIER

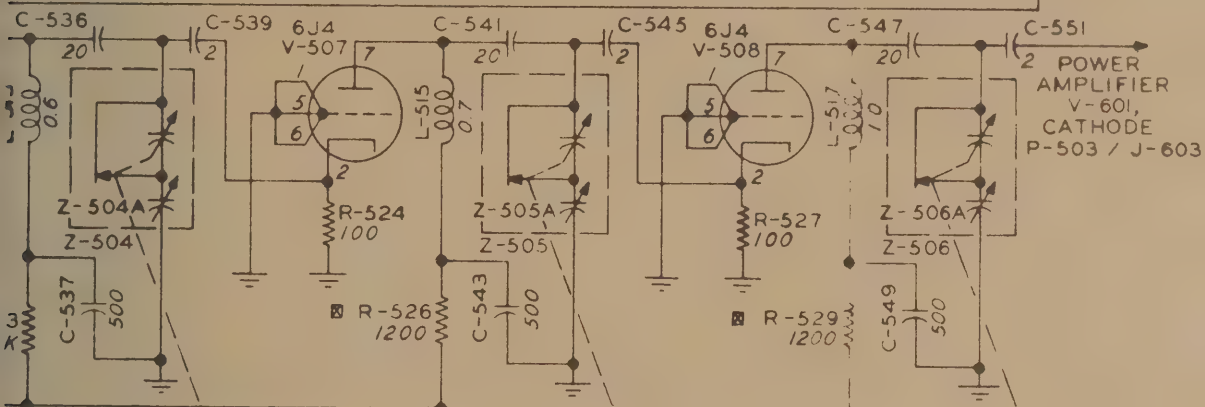
"H" SHAFT



TRANSMITTER PREAMPLIFIER

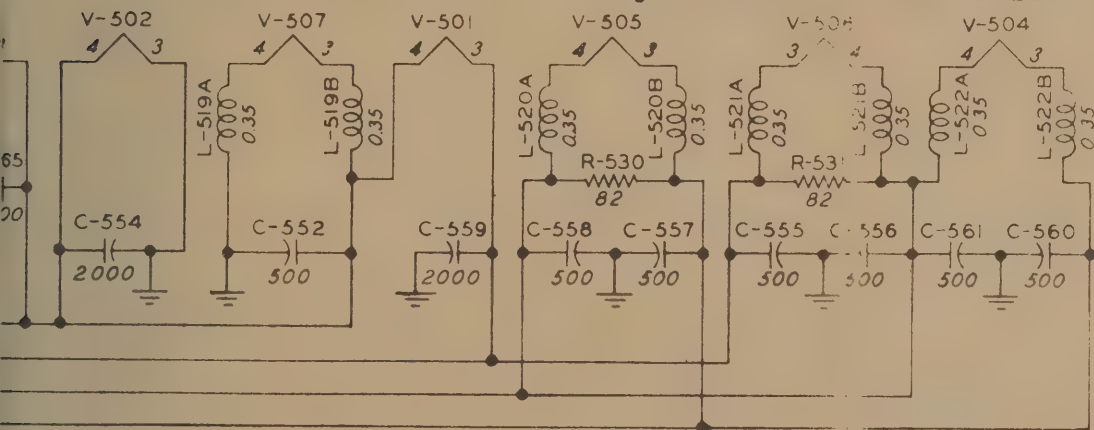
TRANSMITTER PREAMPLIFIER

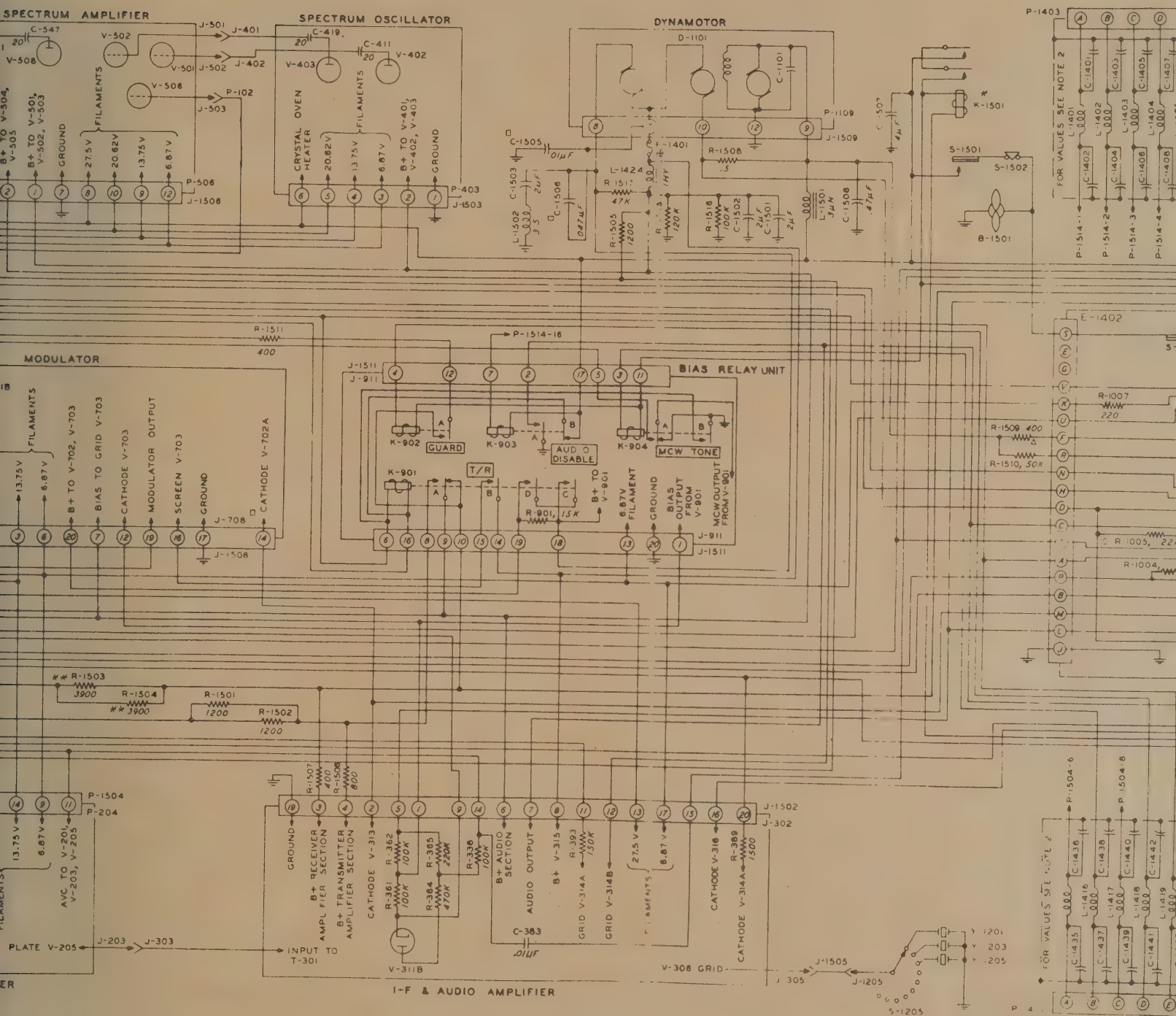
MIXER



POWER
AMPLIFIER
V-601,
CATHODE
P-503 / J-603

"I" SHAFT





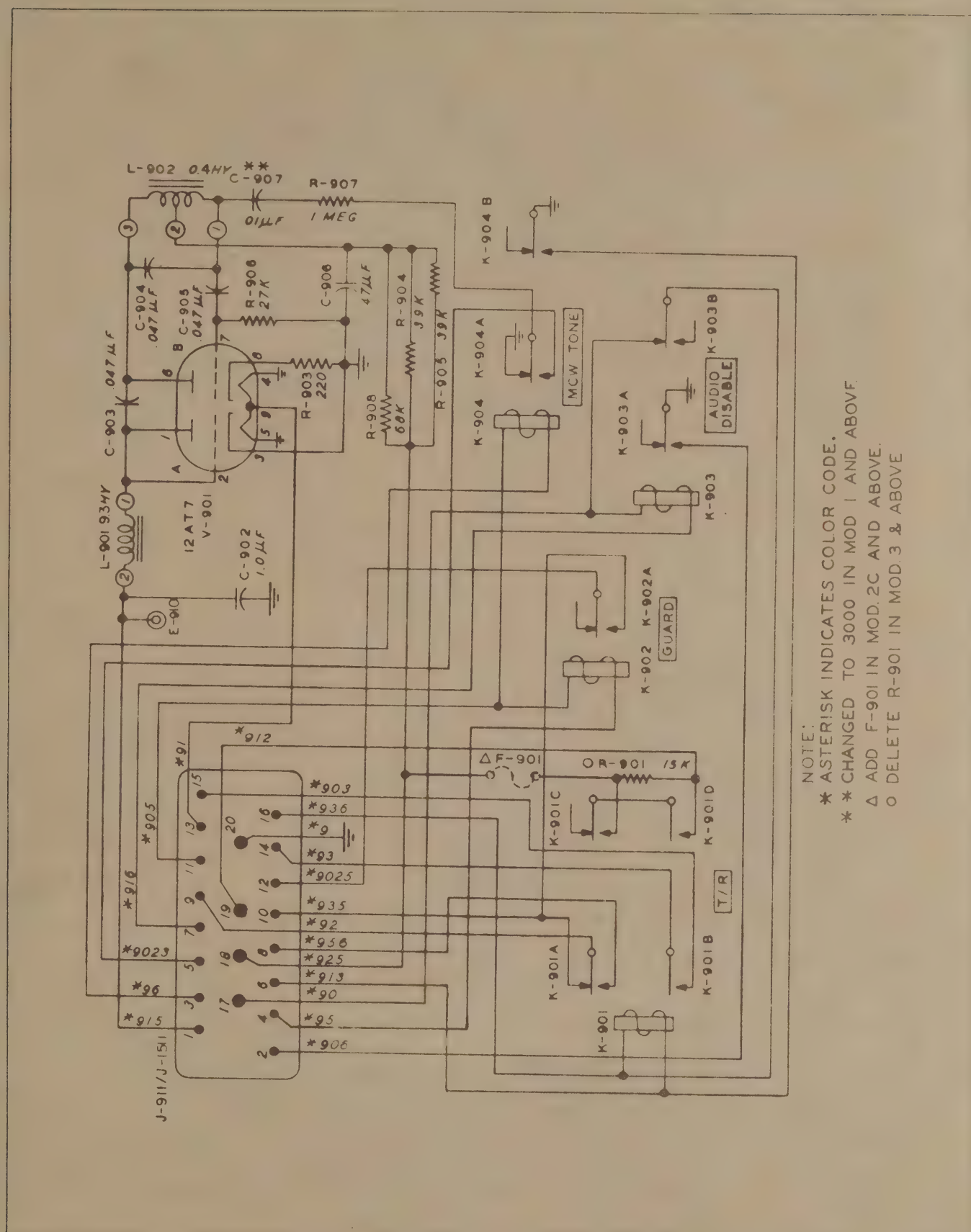


Figure 6-9. Receiver-Transmitter RT-178 ARC-27, Bias Relay Subassembly, Schematic, (Original, Mod. 1, 2, 3)

Revised 15 March 1953

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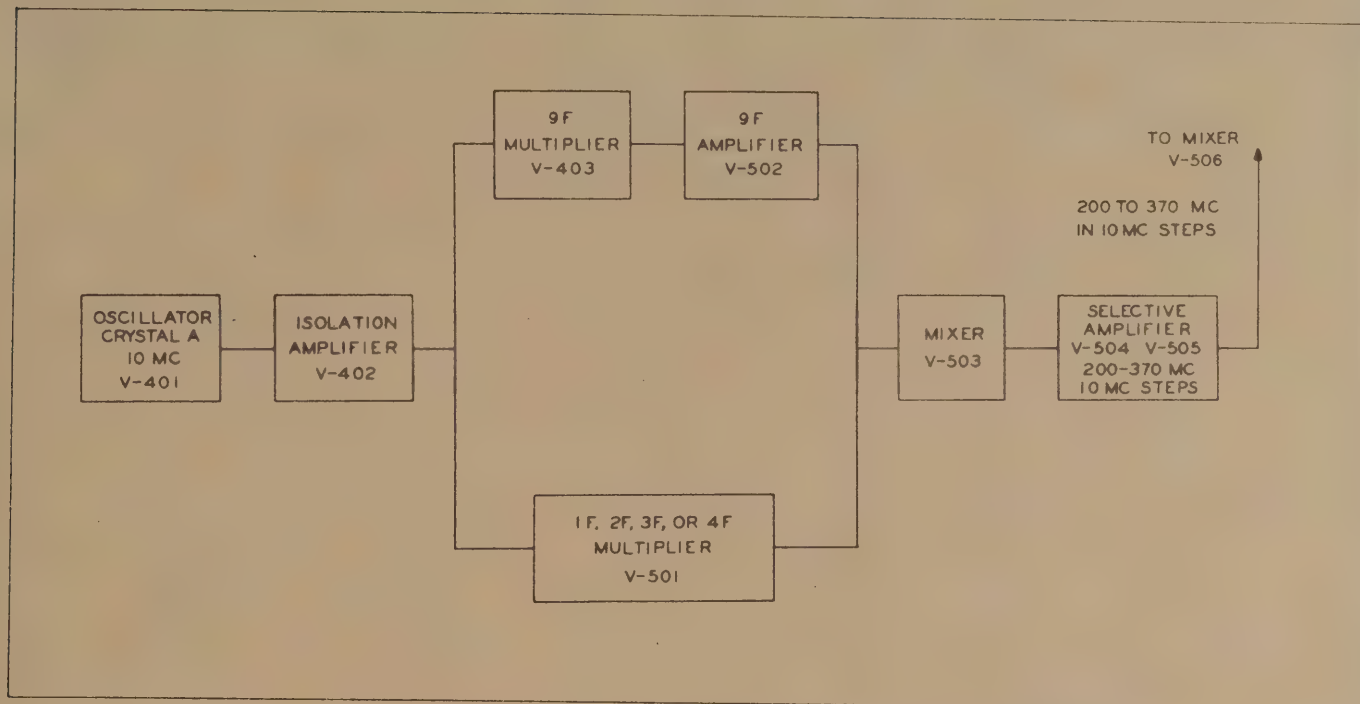


Figure 2-7. Receiver-Transmitter RT-178/ARC-27, Spectrum System, Block Diagram

bandwidths are approximately 100 and 325 kc respectively. Voltage from the avc line is applied to the grid of the amplifier tube V-805.

2-50. FINAL DETECTOR AND AUDIO. The final diode detector V-809A and the noise limiter V-808 are operated just as in the main channel receiver. Similarly V-810A serves as the avc rectifier for the avc amplifier V-810B, which in turn controls operation of the avc gate, V-809B. The squelch tube, V-811A, controls the gain of the audio amplifier tube V-811B. Audio from the latter is coupled through C-876 and R-393 to the grid of V-314A in the main channel IF and Audio Unit.

2-51. THEORY OF OPERATION OF SPECTRUM GENERATING SYSTEM.

2-52. GENERAL. (See figure 2-7.) The spectrum system, consisting of the Spectrum Oscillator and the Spectrum Amplifier, is used to provide injection voltage to the first mixer for the receiver and also in a similar conversion for the transmitter. Fundamentally a 10 mc crystal oscillator is multiplied to obtain harmonics in the range of 200 to 370 mcs. Selectivity is provided to reduce the strength of unwanted harmonics adjacent to the desired one.

2-53. SPECTRUM OSCILLATOR. (See figure 6-3.) This subassembly consists of a highly stable crystal oscillator followed by an isolation amplifier and a multiplier stage. Output from the subassembly is coupled to the Spectrum Amplifier by means of concentric plugs.

2-54. The crystal oscillator consists of a 6AG5

pentode, V-401, in an electron coupled oscillator circuit. The crystal itself is in a HC-6 holder mounted in an oven thermostatically controlled to a temperature of 80°C (176°F). At -55°C (-67°F) ambient this holder is capable of providing proper operating temperature in less than ten minutes. The oscillator section consists of the grid, cathode and screen of the pentode in a Colpitts oscillator circuit. The capacitors C-402 and C-403 are used as the voltage divider. The capacitor C-401 is used to adjust the total capacitance between grid and ground to 32 mmf, which is standard for this crystal. This capacitor is an adjustable element which may be set initially for the correct capacitance and later trimmed slightly to adjust the oscillator frequency to exactly 10 mcs. The latter may be accomplished by comparison to a more precise standard such as WWV. The plate circuit of the oscillator is untuned to increase circuit stability. Overall instability resulting from temperature, tube and aging effects is less than 0.001% which is the requirement of this section of the equipment to meet an overall performance figure of 0.0015%.

2-55. Output from the crystal oscillator is coupled to the grid circuit of a buffer-amplifier to further isolate the crystal oscillator circuit from effects of tuned circuits. This stage consists of a 6AG5, V-402, operated as a Class A amplifier. The plate circuit of this stage is tuned to 10 mcs and coupled to two following multipliers. One multiplier, V-403, is located in this subassembly. It utilizes a 6AG5 operated as a Class C frequency multiplier, multiplying 9 times. The output circuit is therefore tuned to 90 mcs and coupled by means of concentric connector J-401 and J-501 to the following Spectrum Amplifier

Subassembly. The other multiplier is located in the Spectrum Amplifier Subassembly. Drive for it is coupled from the plate circuit of V-402 by means of J-402 and J-502. Plate supply is from the low voltage system through a suitable dropping resistor, R-1505.

2-56. SPECTRUM AMPLIFIER. (See figure 6-4.) This subassembly consists of four basic parts, the spectrum generator, the spectrum amplifier, the transmitter mixer and the transmitter preamplifier. The amplified 10 mc output of the Spectrum Oscillator is further multiplied in this subassembly and combined with harmonics of the 90 mc output in such a manner as to produce spectrum components in the frequency range of 200 to 370 mcs. The desired component is amplified in the selective amplifier and the output is used as injection energy for both the receiver and the transmitter mixers. The latter is located in the Spectrum Amplifier. It is also excited by energy from the 20 - 30 mc I-F Amplifier (operating in the transmit direction) and the sum frequency is then amplified in the following transmitter preamplifier. Output of this preamplifier is used to drive the Power Amplifier.

2-57. SPECTRUM GENERATOR. The spectrum generator consists of the three tubes V-501, V-502 and V-503. The first, V-501, is a 6AG5 pentode operated as a Class C harmonic generator. The grid circuit is excited by 10 mc energy from the isolation amplifier, V-402. The plate circuit has four circuits fixed-tuned to 10, 20, 30 and 40 mcs. The desired circuit is chosen by the corresponding relays K-501, K-502, K-503 and K-504. The output of this stage is coupled to the cathode of the mixer tube, V-503.

2-58. The second tube, V-502, is driven by 90 mc energy from V-403 and is operated as an amplifier with its plate circuit consisting of C-507 and L-505 also tuned to 90 mcs. Output from this stage is coupled to the grid of the mixer tube, V-503.

2-59. The third tube, V-503, is used as a mixer tube to secure desired combinations of the 10, 20, 30, 40 mcs and harmonics of the 90 mc amplifier. These are obtained in the following manner.

$2 \times 90 + 20 = 200 \text{ mcs}$	$3 \times 90 + 20 = 290 \text{ mcs}$
$2 \times 90 + 30 = 210 \text{ mcs}$	$3 \times 90 + 30 = 300 \text{ mcs}$
$2 \times 90 + 40 = 220 \text{ mcs}$	$3 \times 90 + 40 = 310 \text{ mcs}$
$3 \times 90 - 40 = 230 \text{ mcs}$	$4 \times 90 - 40 = 320 \text{ mcs}$
$3 \times 90 - 30 = 240 \text{ mcs}$	$4 \times 90 - 30 = 330 \text{ mcs}$
$3 \times 90 - 20 = 250 \text{ mcs}$	$4 \times 90 - 20 = 340 \text{ mcs}$
$3 \times 90 - 10 = 260 \text{ mcs}$	$4 \times 90 - 10 = 350 \text{ mcs}$
$3 \times 90 - 0 = 270 \text{ mcs}$	$4 \times 90 - 0 = 360 \text{ mcs}$
$3 \times 90 + 10 = 280 \text{ mcs}$	$4 \times 90 + 10 = 370 \text{ mcs}$

Thus the range of 200 to 370 mcs is covered with a frequency available every ten megacycles.

2-60. SPECTRUM AMPLIFIER. The output of the mixer, V-503, is generally not a single frequency, as noted above, since undesired components generally exist in the plate circuit also. In order to discriminate against these and to increase the strength of the desired component, the mixer output is amplified in a

selective amplifier consisting of two 6J4's, V-504 and V-505, and the tuned tank circuits Z-501, Z-502 and Z-503. These tank circuits are ganged together and tuned in 10 megacycle increments by the "H" shaft. The latter is driven directly by the decade frequency control since no trimming for the one megacycle steps is desired.

2-61. Design of the spectrum amplifier is very similar to that of the main receiver amplifier except that the tuning range is 200 to 370 mcs, corresponding to the receiver frequency range of 225 to 400 mcs.

2-62. TRANSMITTER MIXER. The transmitter mixer, V-506, is used to combine the output of the Spectrum Amplifier and the 20 - 30 MC I-F Amplifier to obtain output frequency in the 225 to 400 mc range. The output of the Spectrum Amplifier is coupled into the cathode circuit of the 6J4 mixer, V-506. The output of the 20 - 30 MC I-F Amplifier is coupled to the grid of this tube. The grid is bypassed for the ultra high frequencies by means of capacitor C-534, which is small enough to present sufficient impedance for the 20 - 30 mc energy. The grid is thereby well grounded for uhf so that the 200-370 mc energy does not couple capacitively into the output circuit. The latter is tuned to the sum frequency covering the range of 225 - 399.9 mcs.

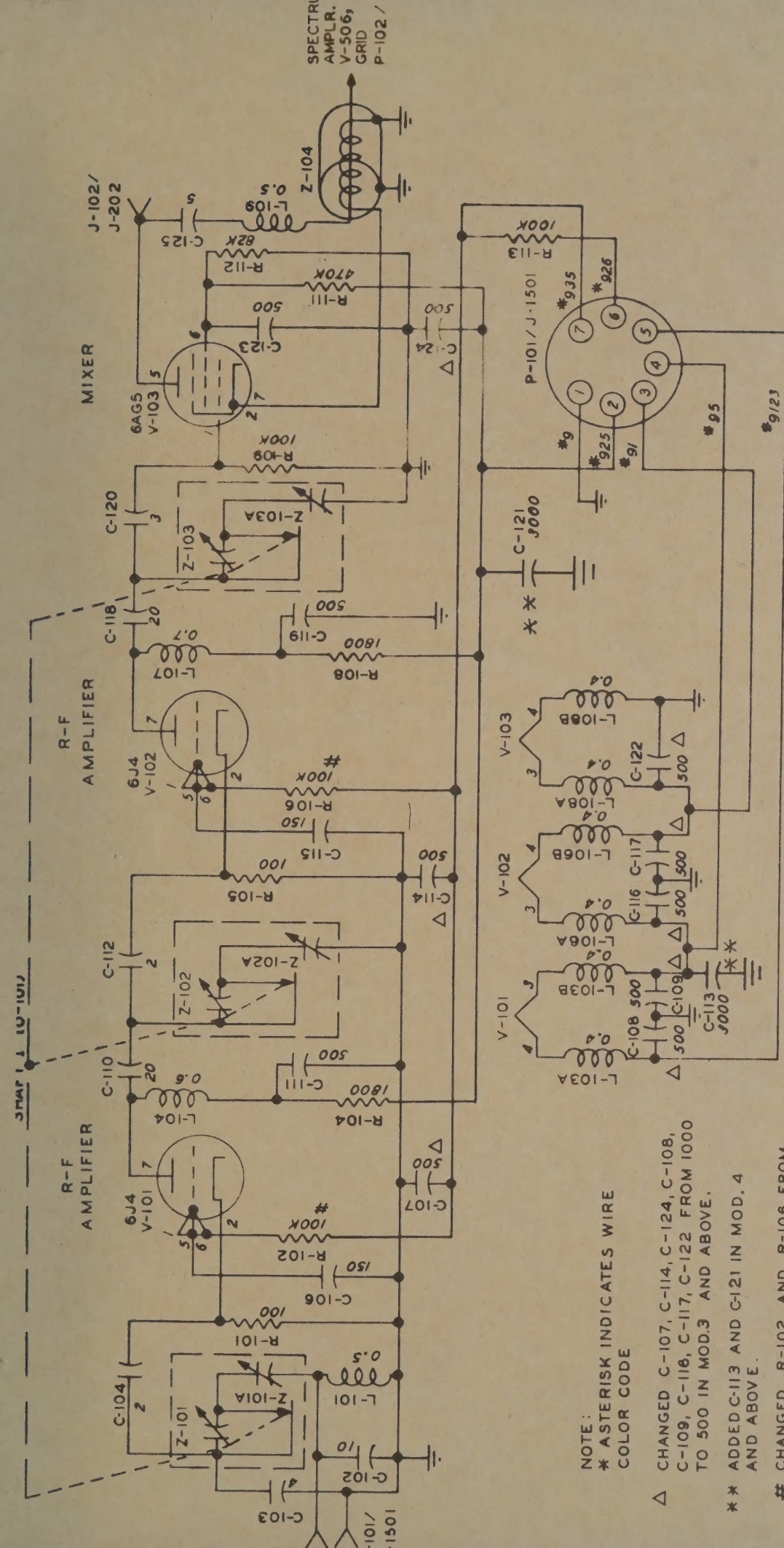
2-63. TRANSMITTER PREAMPLIFIER. Output of the transmitter mixer is amplified in the selective amplifier consisting of tubes V-507 and V-508 and the tuned tank circuits Z-504, Z-505 and Z-506. The 6J4 tubes are used as grounded grid amplifiers very similar to the main receiver amplifier and cover the same frequency range of 225 to 399.9 mcs. The tank circuits are ganged together by spur gears and driven by the "T" shaft. The latter is controlled primarily by the decade dial of Radio Set Control C-626/ARC-27 but is also trim-tuned for one megacycle steps by the unit dial. A mechanical differential adds the shaft positions of these two controls.

2-64. THEORY OF OPERATION OF TRANSMITTER. (See figure 2-8.)

2-65. FIXED I-F AMPLIFIER AND AUDIO. This subassembly includes the 3.45 mc oscillator and the 5.7 - 4.8 mc i-f amplifier which are used in the frequency generation system.

2-66. 3.45 MC OSCILLATOR. The fixed frequency oscillator which forms the starting point for the transmitter frequency consists of the triode V-306B operated as a Colpitts oscillator with the cathode above ground for r-f and the plate bypassed to ground. The capacitors C-330 and C-331 form the capacitive divider. Output from the oscillator is coupled from the cathode to the cathode of the mixer tube V-305B. This oscillator is operated only in the transmit position with plate current supplied through the power transfer relay K-901.

2-67. The grid of mixer tube V-305B is also excited by output from the oscillator V-306A which operates in the frequency range of 9.15 to 8.25 mcs.



Receiver-Transmitter RT-178/ARC-27, Main Receiver R-F Amplifier Subassembly,
Schematic, (Original, Mod. 3, 4 and 5)

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